STEEL
The Metalworking Weekly
A PENTON PUBLICATION
SEPTEMBER 11, 1961

'A U. S. trademark is a plus overseas'
Gordon O. Fraser, executive vice president, AMF International

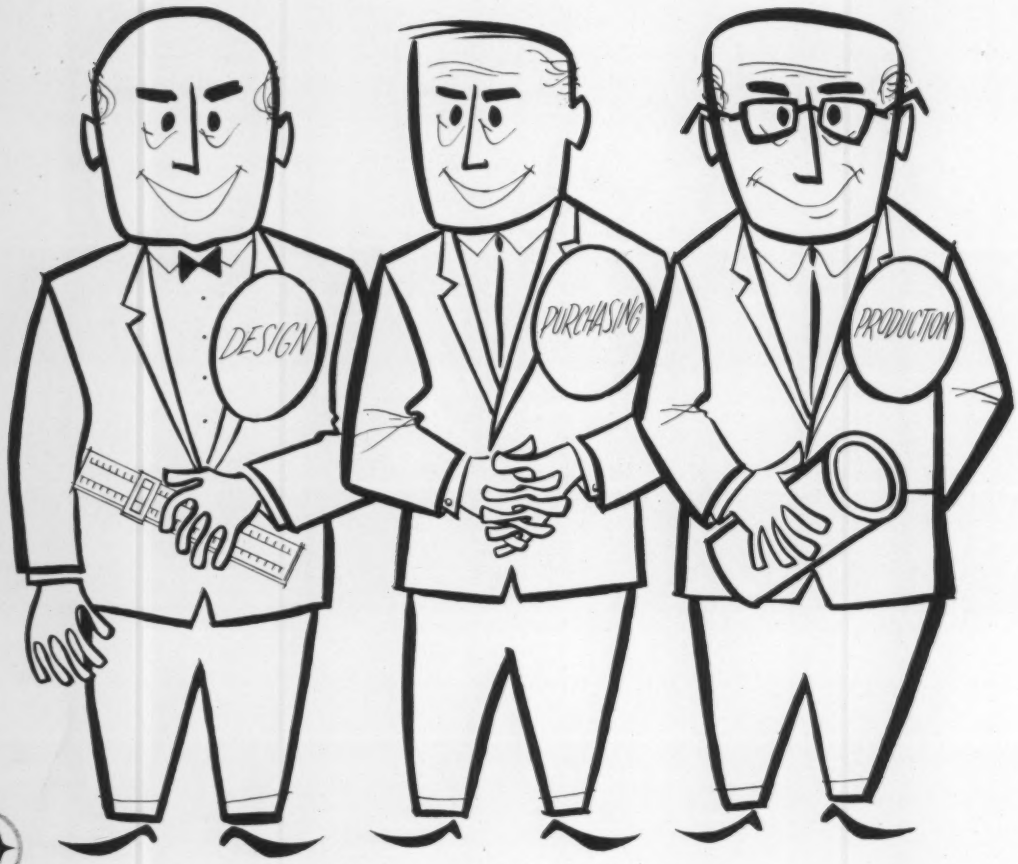
PROGRAM FOR MANAGEMENT

Export for Profit Growth . . . 65

New Army Offers New Markets 59

Forgers Extend Their Technology 102

METALWORKING WEEK—PAGE 17
COMPLETE CONTENTS—PAGE 19



ALL THREE CAN CONTRIBUTE MORE TO LOWER UNIT COST

because of B&W Job-Matched Tubing

How so? B&W makes sure the purchasing agent gets the proper steel tube for the job—when he wants it, at a competitive price. The design engineer can choose from B&W's complete selection of types, grades and sizes to put flexibility into his design—economy and efficiency into the finished product. The production manager can count on B&W's uniform properties and dimensions for fast, easy fabrication —high-speed, low-cost production. In being able to satisfy the specific requirements of all three, B&W Job-Matched Tubing assures a high quality finished product at the lowest possible unit cost.

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B&W

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TUBULAR PRODUCTS DIVISION

TA-1001-G

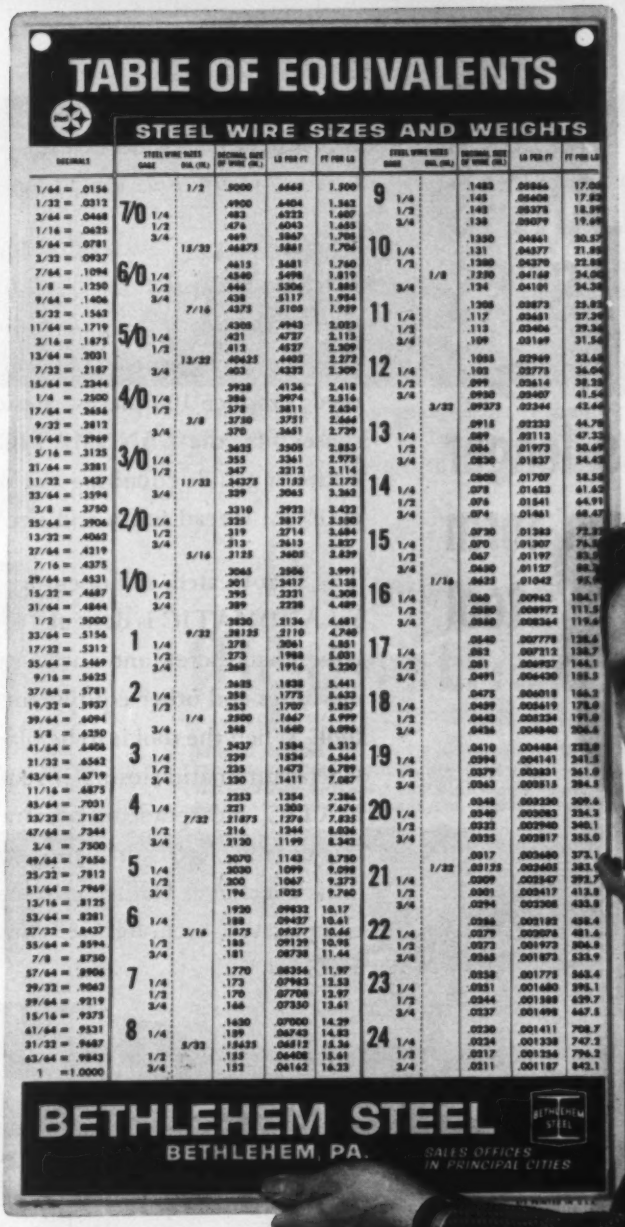
Seamless and welded tubular products, solid extrusions, rolled rings, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

Bethlehem makes just about every kind of

STEEL WIRE

Some are general-purpose grades; others are made for specific applications. If you want information on steel wire, just mail us the coupon below.

1. alloy
2. armor
3. ball
4. bed spring
5. bethanized
6. bicycle spoke
7. border
8. bright basic
9. brush handle
10. cable lashing
11. chain link fence
12. clean bright
13. clothes pin
14. coat hanger
15. cold-heading
16. core (ACSR)
17. extra smooth clean bright
18. fence
19. foundry core
20. galvanized
21. hog ring
22. hose
23. link
24. mechanical spring
25. pail bail
26. rivet
27. rope
28. "scrapless nut"
29. screw
30. screwdriver
31. shaped
32. spoke
33. staple
34. strap
35. strand
36. telephone
37. tire chain
38. upholstery spring
39. welding
40. wool



Steel

for Strength
... Economy
... Versatility

Free Wall Chart

This 18 x 36-in. sheet steel wall chart gives decimal equivalents, wire sizes, and gages from 7/0 to 24¾, with corresponding decimal sizes, lb per ft, and ft per lb. For your free chart, just fill out and mail us the coupon.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

PUBLICATIONS DEPARTMENT
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Dear Sirs:

Please send me information on type of wire circled.

1	6	11	16	21	26	31	36
2	7	12	17	22	27	32	37
3	8	13	18	23	28	33	38
4	9	14	19	24	29	34	39
5	10	15	20	25	30	35	40

and _____.

☐ *Please send "Table of Equivalents" wall chart.*

Name _____

Firm _____

Street _____

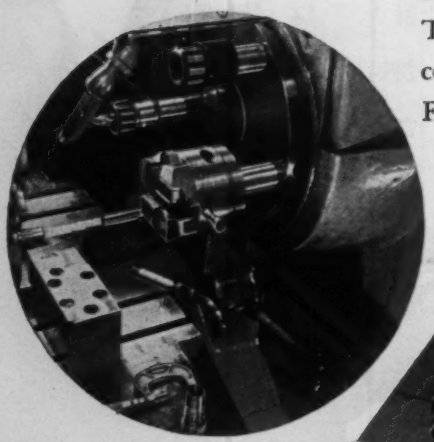
City _____ Zone _____ State _____

LANDIS CHASERS last 6 times longer than form tool

A Landis 1¼" FD LANDMATIC Die Head is shown threading nipples at Pershing Machine Co., Jackson, Mich. Chaser life is 6 times longer than that of the form tools used.

The Head is mounted on a 2½" AB Cleveland Dialmatic Machine and produces 1 1/16" diameter, 18 pitch NEF, Class 2 threads 1" long on Monel metal. The form tools produce only 15 pieces between grinds and the drills, also used, produce 100 pieces. Besides having a longer chaser life, the LANDMATIC Head produces 100 pieces between grinds equalling the drill life. It also produces excellent thread finish and size control.

The heat-treated, self-opening, manually-closed Standard F LANDMATIC is designed for application to turret lathes, hand screw and automatic screw machines, chucking machines and other equipment using a nonrotating type tool. When the tool is to be placed on automatic equipment where automatic closing is required, the FD LANDMATIC, incorporating overtravel, is recommended. It can be cam-closed through special closing pins or bushings. This overtravel feature eliminates the need for a complicated, accurately-set closing cam. Ask for Bulletin F-90.



LANDIS *Machine* COMPANY

WAYNESBORO
PENNSYLVANIA

The World's Largest Manufacturer of Threading Equipment

605

FOR NEW IDEAS IN

HEATING AND MELTING BY INDUCTION . . .

The complete line of furnaces for die casting includes: Single Hearth Holders; Single or Double Hearth Ajaxomatics for automatic pouring; Double Hearth Melters and Holders for hand ladling.

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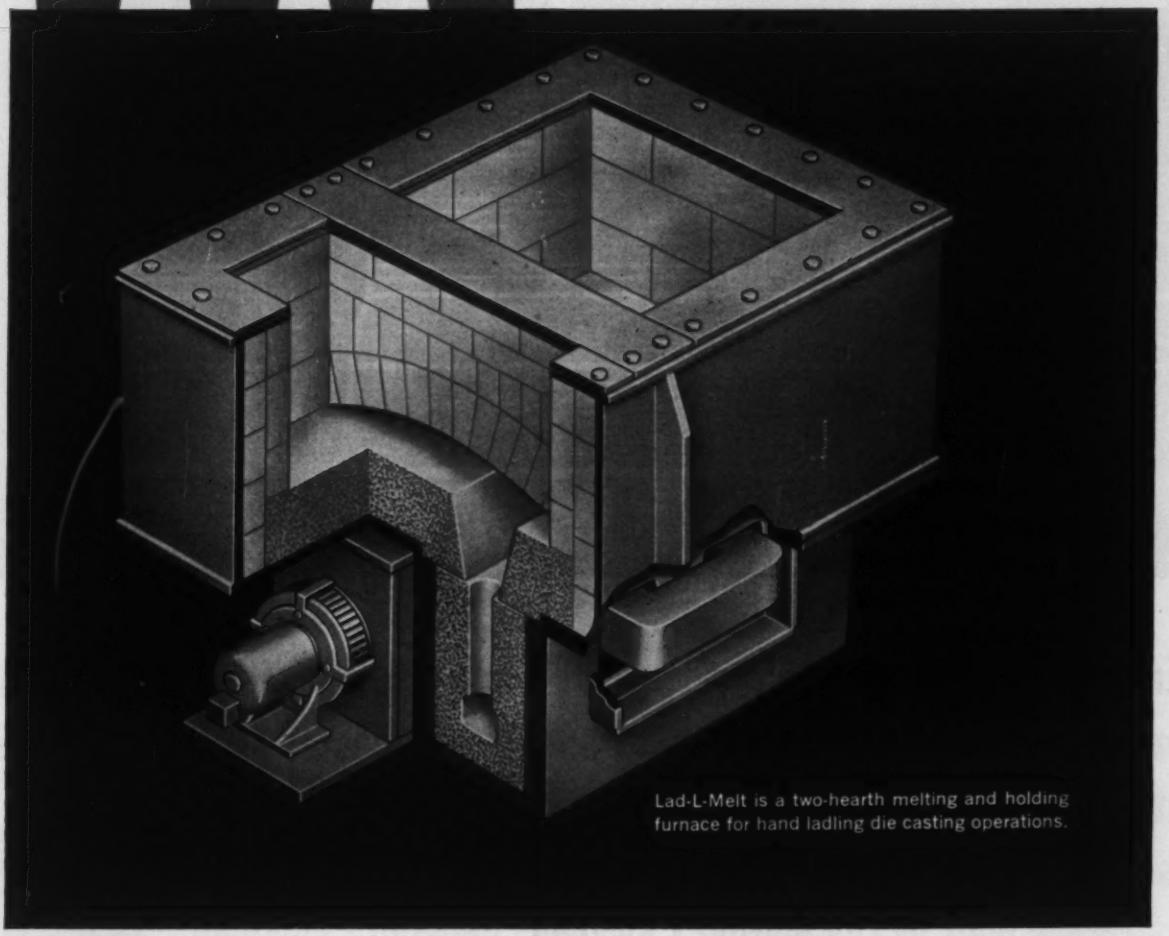
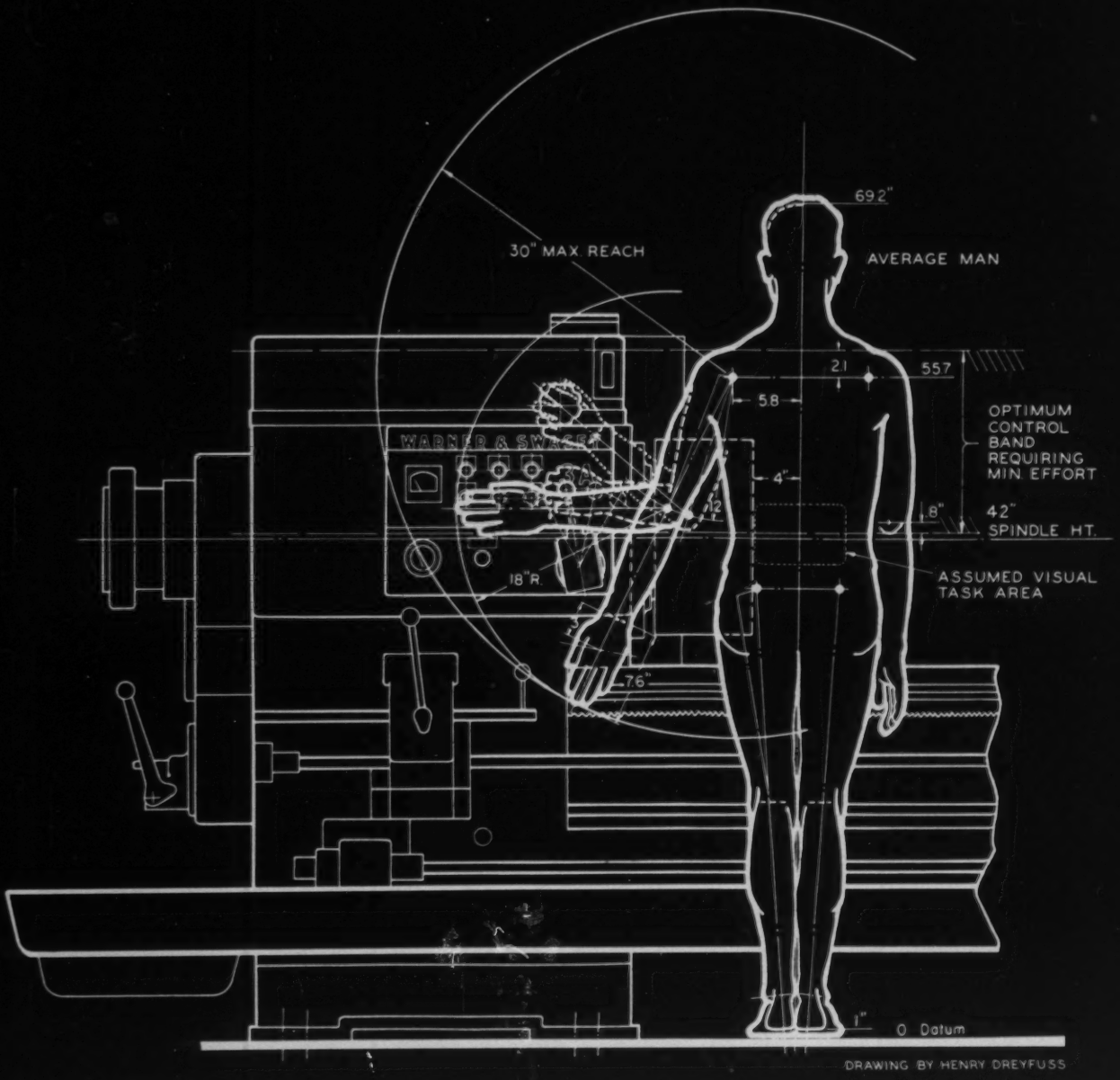


Lad-L-Melt is a two-hearth melting and holding furnace for hand ladling die casting operations.



Ergonomics: it tells us that ideal spindle height is 42". That main control panels should be dark gray. That Speed Preselector knobs should be at 54" height, 4" diameter, and shaped just so. Ergonomics is a science—and a reason why men produce more on machines built by The **Warner & Swasey** Company, Cleveland.

All About Forging

The genial gentleman in the accompanying photo may be smiling about his story on new developments in forgings (Page 102). Associate Editor Ross Whitehead has reason to be pleased because the article is a good one. If you make, use, or could use forgings, we recommend your perusal.

After 13 years with Ford Motor Co. and experience as a heating engineering consultant with Combustion Equipment Corp., Ross joined STEEL in 1955. So his articles on metal forming are tempered with practical experience. Besides writing about forging, he handles many of STEEL's technical stories on welding, stamping, finishing, and quality control.

All About Exports

Are you planning to increase your export activities? Many metalworking companies are. For tips on how to go about it, see Page 65. The eighteenth in our 1961 management series, "Plan for Profit Growth," deals with exports as a means of improving profits. Associate Editor George Howick is the author.

Here's what one reader said about an earlier installment in the series, on reliability, which was also authored by George:

"You are to be congratulated on your constructive effort to improve reliability"—Robert C. Sprague, chairman, Sprague Electric Co., North Adams, Mass.

M. E. of STEEL INTERNATIONAL

George Howick, incidentally, has been appointed managing editor of STEEL INTERNATIONAL, a new magazine for overseas metalworking industries, to be distributed monthly, starting next January, by the Penton Publishing Co.

He'll work with Walter J. Campbell, editor of STEEL and of STEEL INTERNATIONAL. The new magazine will accent news and technical information of interest to overseas metalworking manufacturers. Articles will be in English, with condensations of major features in Spanish, French, and German. It will be selectively distributed to plants employing 100 or more. Initial coverage will include 17,000 plants.

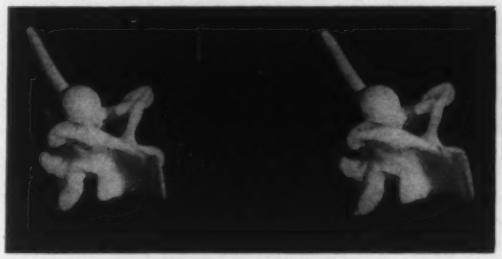
Incidental Intelligence

Item: General Electric Co. was awarded a $50,000 contract to develop refrigerating techniques for space vehicles. Its solution: Ice.

Item: Commercial travelers claim the most courteous and co-operative taxi drivers in the U. S. are in Philadelphia. Do you agree?

Item: At least 15 million individuals own stock in U. S. companies, 74 per cent more than in 1952.

What Is It?



We asked for answers Aug. 28, and they have been rushing in. Unfortunately, most of them have been wrong.

What you see pictured above are two vertebras from a rattlesnake which took about six years to produce those no-manhours ball and socket joints. Honorary Editor No. 2 Larry Megow tells how he got them:

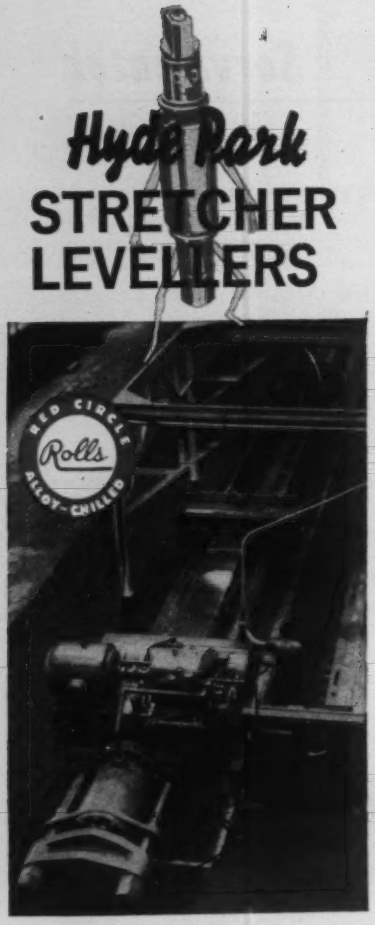
"For some time I have been making a study of Texas rattlesnakes. A few months ago, I got a 62 in. Western diamondback near the famous King Ranch. Deep fried rattlesnake steaks are a delicacy. They look like fish, but taste like chicken.

"In gnawing at the bones, I noted that the design of the back was fascinating, so I polished some of the vertebras, which turned out to be the ball and socket joint."

Larry Megow suggests that we coat them with fingernail polish, mount them, and give them to Mrs. Ed Service as a unique pair of earrings.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

Hyde Park STRETCHER LEVELLERS



Hyde Park Levellers have a complete range of stretching capacities from 150 to 1250 tons—for levelling ferrous and non-ferrous sheets in sizes up to 120 inches wide by 500 inches long.

Adaptable for automatic cycling.

Pneumatically or hydraulically operated wedge or toggle type jaws.

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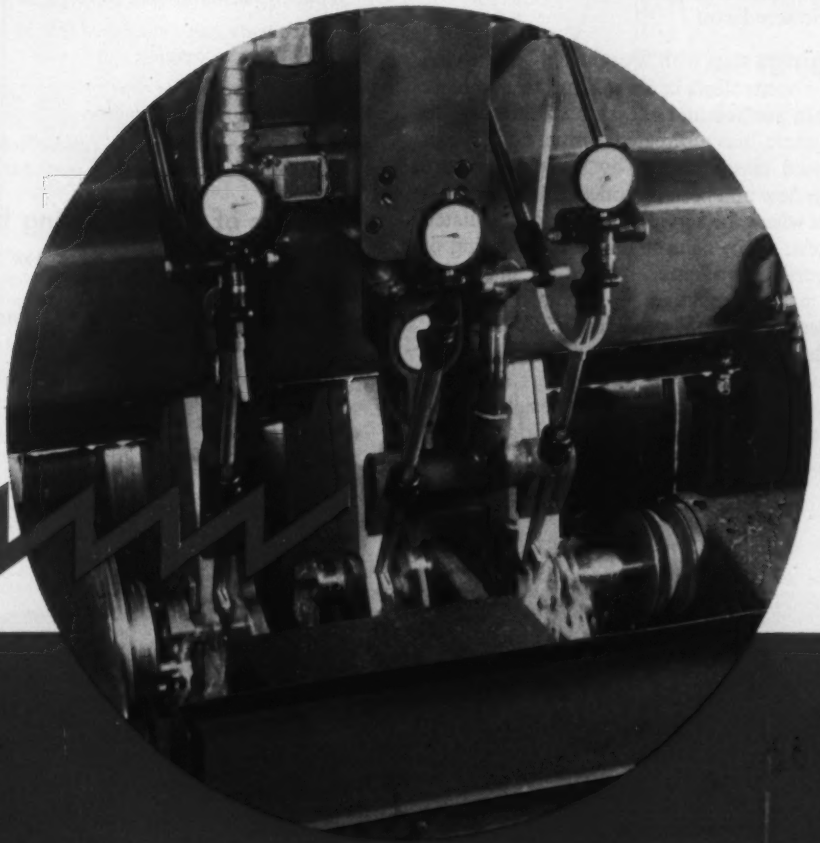
14″ IWR Multiple Wheel grinder

Landis production grinders with Microfeed® deliver closer tolerances consistently



Microfeed

- a new Landis precision wheelfeed that is a major breakthrough in size control
- assures cylindrical grinding precision to your specified tolerances on a production basis
- automatically cancels all variables that have an effect on final work size
- available on new Landis grinders

For multi-wheel or single wheel grinding, Microfeed assures quality and reliability.

LANDIS

LANDIS TOOL COMPANY, WAYNESBORO, PA.

New Forging Idea News

How to Improve Parts Design with This Fresh Approach to Forging

Design Refinements suggested by COMMERCIAL'S forging experts make many parts in use today better, more economical. Here are detailed examples of only three COMMERCIAL upset forgings which demonstrate how these design refinements have resulted in superior OEM parts at lowered cost.

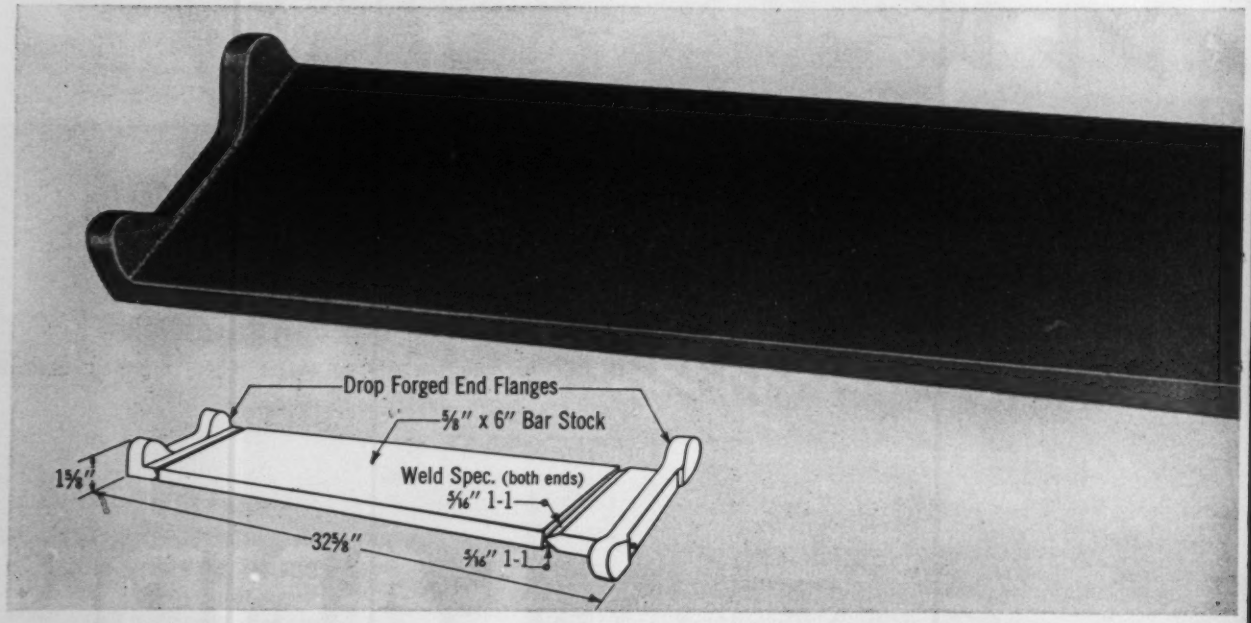
Quality Forgings start with "Forging Quality" rolled steel...closely controlled in its making to eliminate defects, to obtain surface and interior soundness, to refine grain structure into a directed fibrous flow. Upset Forgings in closed dies produces by squeeze pressure a "looped" grain flow and permits concentration of grain density at points where the service stresses are calculated to be the greatest. Also, control of the directioning of the inherent fiber-like structure provides for maximum strength of the metal at required stress points. Not only are the properties of the metal improved in all directions, but also the metal structure is refined and compressed resulting in a structural uniformity that renders the metal remarkably free from concealed defects. Result: Tough, strong part—free of hidden defects and surface flaws.

Advantages of Upset Forgings

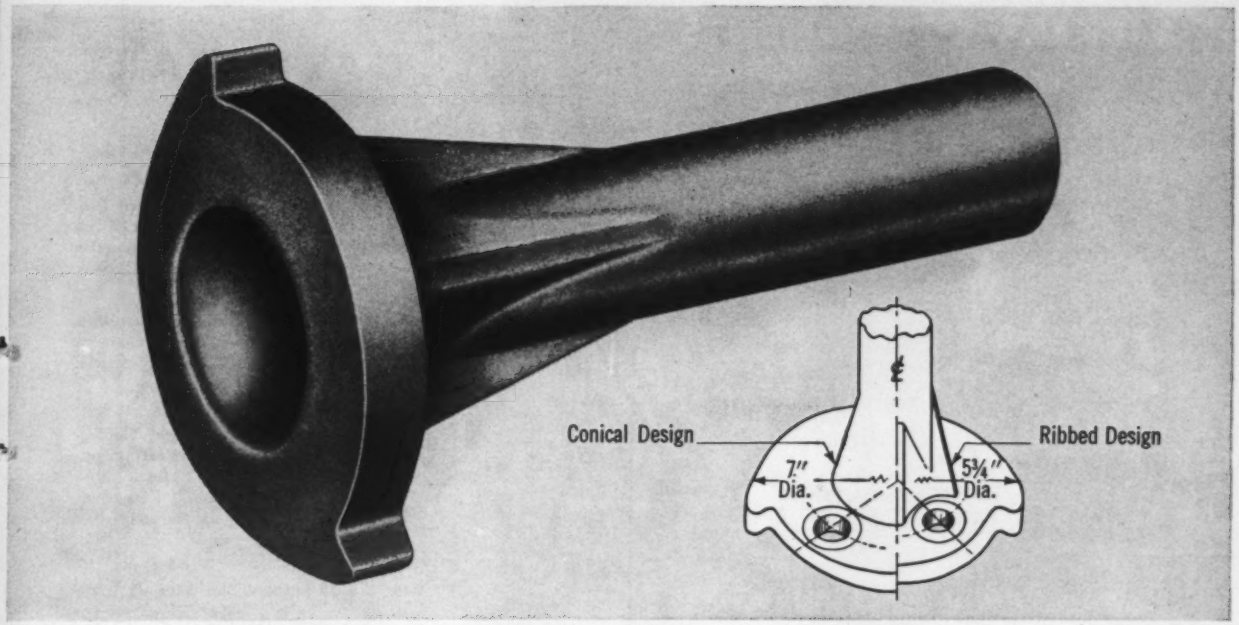
- *Uniform strength, toughness and high fatigue resistance insure longer, more dependable service life for equipment.*
- *Parts made closer to finished dimensions—cuts scrap, reduces machining and finishing time.*
- *Components can be assembled by simple production methods into complex parts.*
- *Uniform response to heat treatment gives desired physical properties of precise degree.*
- *Higher strength-to-weight ratio obtainable—a vital factor in the design complexity of parts for the future.*

Features of Upset Forging by COMMERCIAL

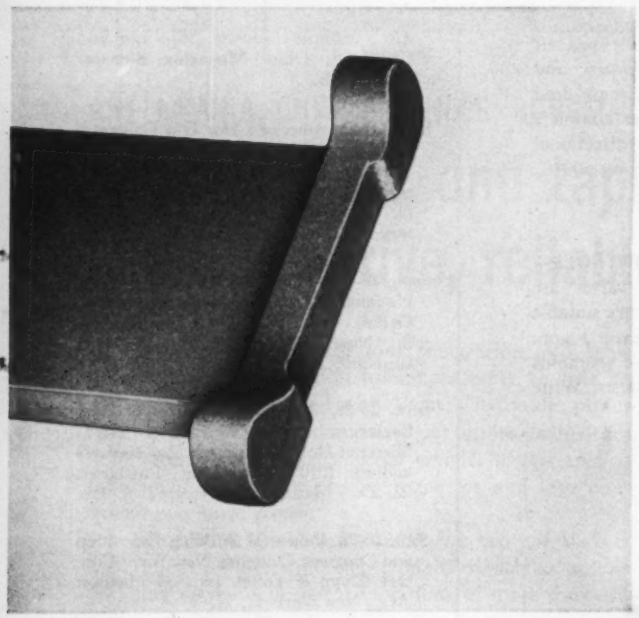
- *Batteries of upsetters from 1½" to 8"—custom or production runs.*
- *Hydra-Jet descaling prior to forging reduces imbedded surface scale.*
- *Magnetic particle depth inspection to detect metal faults before shipment.*
- *"Task Forging" team steeped with experience in producing the unusual upset forging.*



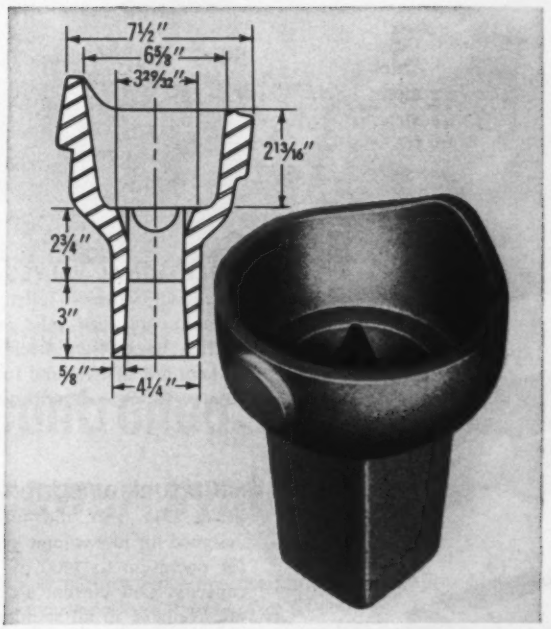
FORGING REPLACES WELDMENT—Structural side bar for agricultural tractor was formerly fabricated from ⅝" x 6" mill-edge bar stock and two drop forged end flanges. COMMERCIAL'S redesign called for a homogeneous "metal quality" upset forging. Controlled, fiber-like grain structure is concentrated at stress points. All welding and grinding is eliminated. Warpage disappeared and surfaces are smooth ready for final high lustre finish. Except for automated drilling of holes, now possible due to close tolerance forging, the part is ready for assembly line. Customer benefits have decisively proved the advantages of COMMERCIAL'S "Task Forging" team know-how.



FRESH APPROACH DESIGN SAVES 25%—Lower front end steel tractor spindle, if produced to conventional design, presented excessive weight problem. Symmetrical conical taper from shank to cam head called for 45 lbs. blank weight. COMMERCIAL produced the part to the ribbed taper design with 34 lbs. blank weight. Here is an excellent example where closed die forging most efficiently positions quality metal. Even the cam ears were upset to exact size and location. Result: Smaller part with ample strength, important cost benefits.



While designs are on the board, call on COMMERCIAL'S "Task Forging" team to collaborate with you. Many other ingenious solutions by COMMERCIAL to tough forging problems are detailed in Bulletin 600-P1. Write Commercial Shearing & Stamping Company, Dept. L-39, Youngstown 1, Ohio.

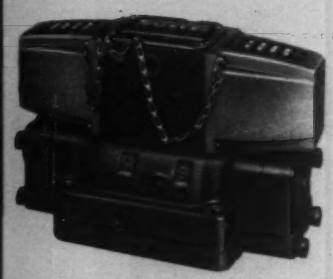


UNIQUE FORGING SUPPLANTS CASTING—Unusually shaped axle trunnion socket seemingly was a natural for casting because of a symmetrical trunnion end plus external boss. COMMERCIAL produced the part to finished size via closed dies in an 8" upsetter. Metal had to be displaced both internally and externally. Result: Rejects cut way down, less machining, stronger part, weight reduced, metal saved.

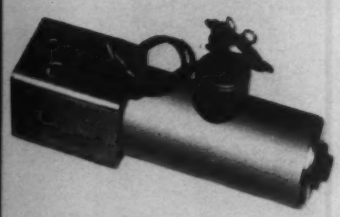
When it's a vital part, design it to be FORGED

COMMERCIAL
shearing & stamping

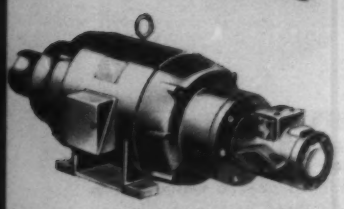
BURGMASTER USES THESE VICKERS COMPONENTS



POWER PACKAGES—A complete Vickers 30-gallon hydraulic power supply was custom-designed and built for this machine. Vickers offers standard and custom power packages to meet every type of application need. Get details from your Vickers application engineer.



DIRECTIONAL VALVES—Two types of directional valves—solenoid operated and solenoid controlled, pilot operated—are used on this Burgmaster machine. The complete Vickers line of two- and four-way directional control valves is described in Catalog 5001C.



MINIATURE DIRECTIONAL CONTROLS—Series D1L two and four-way valves are designed for low volume systems, are suitable for operation to 1000 psi and have 2 gpm capacity. Low current a-c and d-c solenoids are available in all standard voltages. Write for data sheet D1L-1.

MOTOR PUMPS—A 5 HP, double-end motor pump is used on this Burgmaster. The complete Vickers motor pump line offers single, double, two-pressure and two-stage pumps. Use of these motor pumps conserves space and eliminates alignment problems between pump and motor. Details are available in Catalog 5001C.

VICKERS®

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DIVISION OF SPERRY RAND CORPORATION

Machinery Hydraulics Division

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CALENDAR
OF MEETINGS

Sept. 17-21, Non-ferrous Founders' Society: Annual meeting, Shawnee Inn. Shawnee-on-Delaware, Pa. Society's address: 1604 Chicago Ave., Evanston, Ill. Executive secretary: Herbert F. Scobie.

Sept. 19, Electric Overhead Crane Institute, Inc.: Meeting at Palmer House, Chicago. Institute's address: 1 Thomas Circle, Washington 5, D. C.

Sept. 20-22, National Industrial Conference Board Inc.: Annual marketing conference, Waldorf-Astoria Hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Sept. 21-22, American Institute of Electrical Engineers: Industrial electronics symposium, Bradford Hotel, Boston. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Sept. 24-26, Steel Founders' Society of America: Fall meeting, The Homestead, Hot Springs, Va. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Sept. 24-28, Pressed Metal Institute: Annual meeting, Grand Hotel, Point Clear, Ala. Institute's address: 3673 Lee Rd., Cleveland, Ohio. Managing director: J. D. Keith.

Sept. 25-27, American Hot Dip Galvanizers Association Inc.: Fall meeting, Sheraton-Jefferson Hotel, St. Louis. Association's address: 5525 Manning Place N. W., Washington 16, D. C. Secretary: Charles E. Perry.

Sept. 25-28, American Welding Society: National fall meeting, Adolphus Hotel, Dallas. Society's address: 33 W. 39th St., New York 18, N. Y. National secretary: Fred L. Plummer.

Sept. 25-28, Association of Iron & Steel Engineers: Annual convention, Penn-Sheraton Hotel, Pittsburgh. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Sept. 25-28, Industrial Building Exposition and Congress: Coliseum, New York. Contact Clapp & Poliak Inc., 34 Madison Ave., New York 17, N. Y.

Sept. 27-28, American Die Casting Institute Inc.: Annual meeting, Edgewater Beach Hotel, Chicago. Institute's address: 366 Madison Ave., New York 17, N. Y. Secretary: David Laine.

ANTTI RAIHA, CHIEF ENGINEER, BURGMASTER CORP. SAYS:

"Hydraulic and tape controlled turret drills need sensitive, reliable power systems..."

". . . in order to control tool penetration and table positioning where location tolerances must be held to .001-inch. We've worked with Vickers hydraulic power systems since 1951, beginning with our automatic hydraulic models, we are increasing our activity in this area as the demand for turret drilling machines and tape controlled machines grows.

"In addition to the machine shown, we use Vickers hydraulics on seven different standard models as well as on many specially designed variations of these standard machines. We rely on Vickers hydraulic power systems, not only for their unusually high quality, but because they are easy to maintain and we have the additional assurance of the availability of their worldwide service organization.

"Because Vickers application engineers have given us close cooperation and have a thorough understanding of our requirements, we've been able to develop systems that provide long, trouble-free life."

Whether you are building standard or special purpose machinery, your power and control requirements can be met precisely and economically by the proper application of hydraulic systems. Typical Vickers components and systems used by Burgmaster are shown on the facing page. They are part of the broadest line of top quality hydraulics available anywhere.

VICKERS®

VICKERS INCORPORATED

DIVISION OF SPERRY RAND CORPORATION

Machinery Hydraulics Division

ADMINISTRATIVE and ENGINEERING CENTER

Department 1480 • Detroit 32, Michigan

GRAPHITAR®

(CARBON-GRAPHITE)

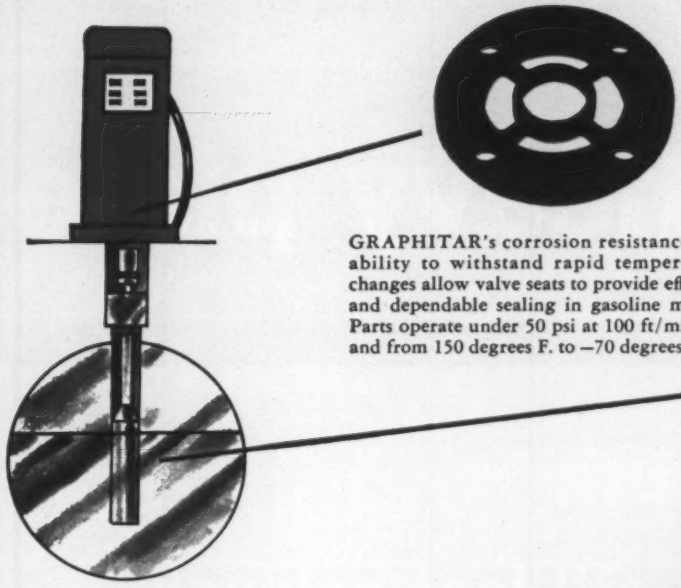
FOR PERFORMANCE

Superior performance and unusually long service life, even in tough applications, is practically second nature to parts made of GRAPHITAR. That's because they combine GRAPHITAR's chemical stability, heat resistance, low coefficient of friction, adaptability to self-lubrication, mechanical strength, hardness and light weight. An everyday application of GRAPHITAR that illustrates well its versatility and remarkable performance can be found in the face-type valves employed in bulk station gasoline meters.

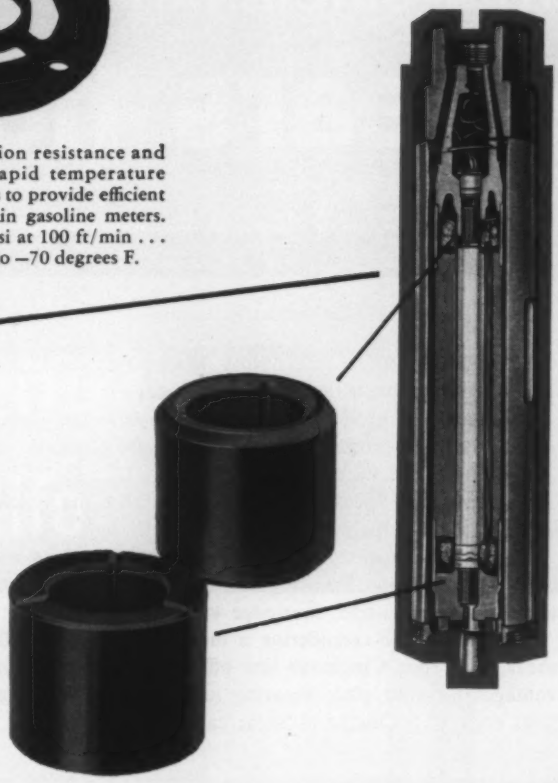
These valves incorporate GRAPHITAR seats. Here, GRAPHITAR's corrosion resistance, chemical inertness and resistance to expansion or contraction under rapid temperature changes, allow the valves to provide a leak-tight seal with excellent wear characteristics. These same characteristics are necessary for good performance wherever steam, gas and chemicals must be handled under the most adverse conditions. Perhaps your product can benefit from the top performance of GRAPHITAR, a unique and versatile engineering material.

Comparative testing of various grades of GRAPHITAR self-aligning seals is accomplished on this equipment, which duplicates actual operating conditions. GRAPHITAR rotary pressure joint seals such as these often operate at 400 psi, at 650° F. and at rotary speeds of 600 ft/min.

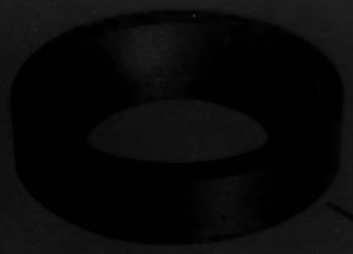
Tests show that the compressive strength of GRAPHITAR grades varies from 4,500 to 45,000 psi. Correct part design can take advantage of this desirable characteristic to aid part performance.



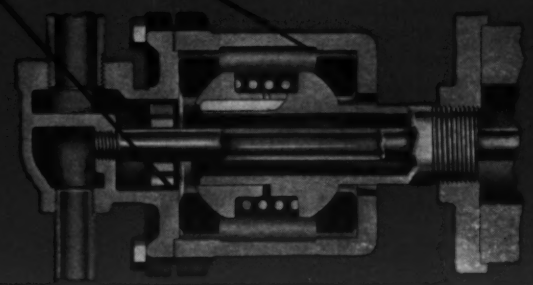
GRAPHITAR's corrosion resistance and ability to withstand rapid temperature changes allow valve seats to provide efficient and dependable sealing in gasoline meters. Parts operate under 50 psi at 100 ft/min . . . and from 150 degrees F. to —70 degrees F.



Running directly in the gasoline reservoirs below ground level, a submersible, explosion proof pump depends on two GRAPHITAR bearings to keep its operation safe and smooth. GRAPHITAR is non-metallic, will not weld or score even when in contact with a dry metal shaft. Because GRAPHITAR operates with *any* liquid as a lubricant, it is an ideal bearing material wherever low viscosity liquids such as gasoline are encountered.



Self-aligning seals of GRAPHITAR are employed in rotary pressure joints handling steam, water, hot oil, trichlorethylene, powdered talc and a variety of chemicals. GRAPHITAR has the ability to withstand the action of many such chemicals and only very highly oxidizing reagents in hot and concentrated form can react to destroy GRAPHITAR.



GRAPHITAR is a material uniquely designed by its nature for solving tough problems and improving processing, and it can be further custom-engineered to meet your exact specifications. For complete information on GRAPHITAR . . . send for Engineering Bulletin #20.

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 18, MICHIGAN

GRAPHITAR® CARBON-GRAPHITE • GRAMIX® POWDER METALLURGY • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

R-299-2

THIS CINCINNATI® shears heavy plate

Paragon Bridge & Steel Co., Novi, Mich., cuts costs as it cuts heavy plate with this Cincinnati Shear:

Operators cut production time with rapid, easy gaging and adjustment; no need for changing knife clearance to cut different thicknesses of metal.

The Cincinnati Shear also permits square shearing, notching, and slitting operations.

This machine can trim an edge to one-half the thickness of a sheet or plate. Furthermore, longer knife life is obtained from extra-size, four-edge knives.

Whether you're considering a mechanical or hydraulic shear, the broad Cincinnati line offers you maximum advantages for your plate shearing requirements. Write for your copy of a Cincinnati Shear catalog.

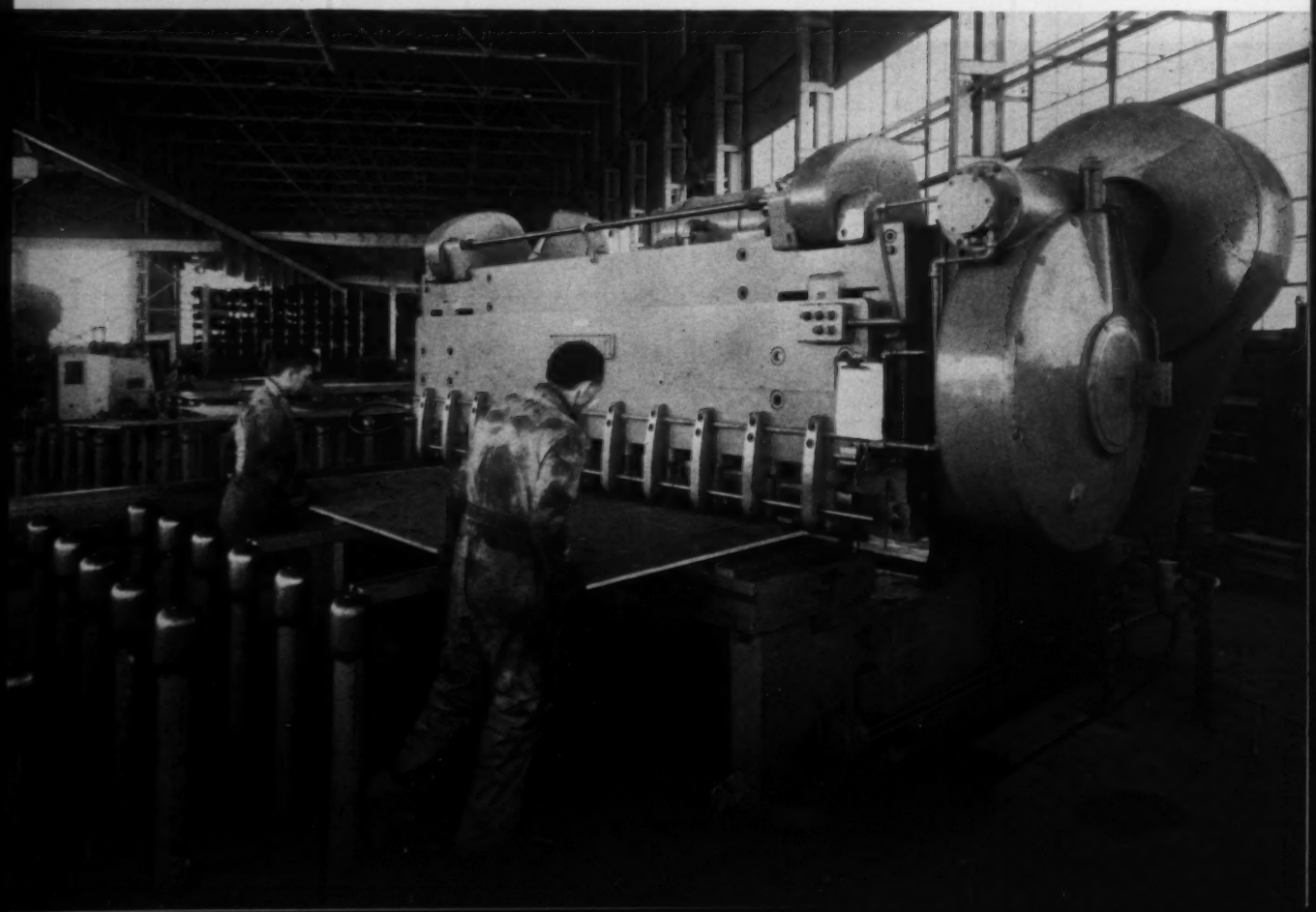
Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.

United Kingdom: The Cincinnati Shaper Co., Ltd., Glasgow, Scotland

Courtesy Paragon Bridge & Steel Co., Novi, Mich.

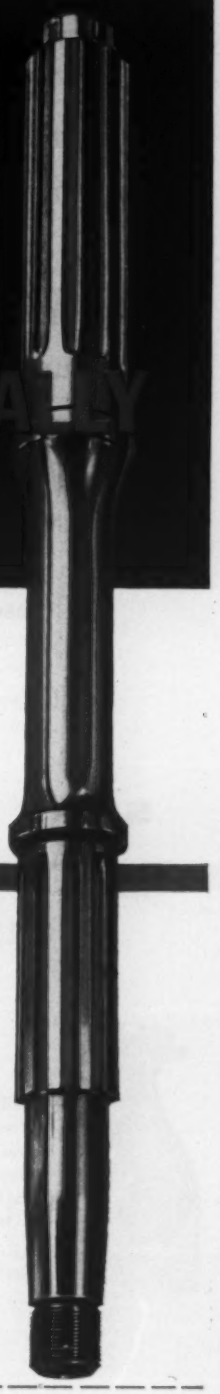


Rockwell-Standard
changes from hot-rolled A-4140 to

fatigue-proof
STEEL BARS

elevated temperature drawing process **e.t.d.**

INCREASES PRODUCTION SUBSTANTIALLY — doubles tool life



Increases turning production 20%

Increases drill life 50%

Eliminates heat treating

Here's an example of how a small additional investment in material enabled Rockwell-Standard to increase production and cut cost on an axle for farm equipment.

Part: Axle for a self-propelled harvester.

Steel: FATIGUE-PROOF steel bars . . . replacing HR resulphurized A-4140.

Result: Heat treating eliminated. More uniform hardness across the section (302 Brinell) including small diameters. Hand straightening eliminated. Shaft runout in turning, reduced from an average of .015" to .005" in turning. Lower cost per part.

PRODUCTION INCREASES

Turning Operations: Speed increased approximately 45%. Tool life increased from 12 to 25 pieces per tip . . . tungsten carbide tips were used.

Drilling Operations: Drill life increased approximately 50% with FATIGUE-PROOF.

Milling Keyway: Entire lot of 550 pieces were run on one cutter . . . cutter formerly required sharpening after 300 pieces.

Hobbing Operations: Production increased approximately 60% . . . from 26 pieces per hour to 44.2 pieces per hour. Hob life doubled.

FATIGUE-PROOF steel bars offer all these cost cutting advantages.

No heat treating necessary—no quench cracks, warpage or other heat treating problems. Costly operations eliminated.

Exceptional Uniformity—from surface to center, end to end, bar to bar, size to size, and lot to lot.

Faster Machining—faster than annealed alloys; 50% to 100% faster than heat treated alloys.

La Salle STEEL CO.

1414 150th Street
Hammond, Indiana

Available from your Steel Service Center

Send for FATIGUE-PROOF bulletin entitled, "A New Material." 24 Pages. Do it today!

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

SEAWAY STEEL gives you
the *exact* steel you need
when you need it!

We can produce
any size rod or bar
to your exact specifications and
...produce it faster.

SPECIAL ANALYSIS

SPECIAL SURFACE FINISHES

SPECIAL HARDNESS

SPECIAL HEAT TREATING

QUALITY-FORGING AND COLD HEADING

SOME SCHEDULES
CAN'T BE CHANGED
OURS CAN

NEED NICKEL ?
If you want the flexibility
and personal service that can
come only from an
INDEPENDENT SOURCE OF
ROLLED NICKEL ANODES... call us.
SEAWAY NICKEL DIVISION
North Tonawanda, New York

Steel

SEAWAY STEEL DIVISION

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Kennedy Advisers Say Steelmakers Can Hold the Line

President Kennedy's economic advisers believe: Despite wage increases due Oct. 1, the steel industry can hold its price line and still have aftertax profits of 7 to 15 per cent on its equity in the fourth quarter—even higher in later months. Mr. Kennedy recently urged the industry not to raise prices, asserting it could absorb wage increases and still "insure a good profit." For a look at price and wage comparisons for the last four years, see Windows of Washington, Page 62.

PAs See Return of Healthy Business

The nation's purchasing agents say business is making a comeback. Of the buyers polled by the National Association of Purchasing Agents, 37 per cent said August orders were up; only 12 per cent reported declines; 49 per cent said production was higher; 13 per cent had drops. Inventory increases over the next six months were planned by 46 per cent; 45 per cent expected no additions in the foreseeable future; and 9 per cent planned further reductions.

Corporate Profits Dipped During Last Decade

Corporate profits after taxes slid from $22.8 billion in 1950 to $22.7 billion in 1960, while wages were increasing almost continuously, says Goodbody & Co., New York. The ratio of corporate profits to gross national product dropped from nearly 8 per cent to 4.5 per cent during the last decade. The consulting firm doubts that the 1950 ratio will ever be restored, but it looks for substantial improvement in the first quarter of 1962 because of corporate belt tightening and increased productivity.

Canadian Manufacturers Have Profit Problems Too

E. D. Mathers, president, Canadian Manufacturers' Association says: "More buoyant economic conditions are in the making . . . but let us remember the low point we are improving from." He says that last year's profit on manufacturers' sales was less than 5 cents on the dollar—the lowest level in 13 years.

Pressures Mount for Release of Tin from Stockpile

The General Services Administration has asked Congress for authority to sell 50,000 long tons of tin from the U. S. strategic stockpile. Tin prices in New York went over $1.25 a pound last week. Consumption exceeding production and heavy speculation in tin futures have created the price flurry. It's no secret that many stockpile materials are in excess of updated requirements and the government would like to trim stocks without affecting normal mar-

kets or alienating friendly governments. There's sure to be fireworks over GSA's proposal.

New Army Offers New Markets

"National security depends, as never before, upon the imagination and boldness with which we acquire and utilize new scientific discoveries and industrial techniques," states Lt. Gen. Arthur G. Trudeau, Chief, Army Research & Development. The Army's modernization program demands the talents of more and more metalworking firms and could become a hardware market of $6 billion a year. For a look at the Army's requirements and how you might participate in this growing market, see Page 59.

ICC Proposes Federal Aid to Railroads

The Interstate Commerce Commission has called for a federal subsidy to maintain railroad passenger service. The recommendation is an outgrowth of the commission's investigation of the New York, New Haven & Hartford Railroad—the ICC doesn't think it has much of a chance unless federal assistance is given. If all railroads operating passenger service applied for subsidies, the program would cost about $52 million annually.

Generator Stops Well Casing Corrosion

A Westinghouse Electric Corp. thermoelectric generator is protecting a mile-deep gas well in El Paso, Tex. The generator taps a small amount of gas coming from the well, burns it, and converts the heat directly into electricity. Reversing the normal flow of current set up by the well casing's chemical reaction with the soil, the generator causes the ground bed, rather than the casing, to be slowly eaten away.

Babies Mean Business

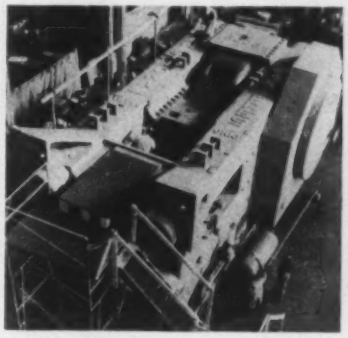
Du Pont economists have figured what last year's 4 million new babies will use up during their lifetimes. Here's a sample of what they'll buy:

6.5 million refrigerators	1 billion pairs of shoes
1 million new homes	25 billion lb of beef
200 million tons of steel	63 million suits and dresses
65 million tons of paper	11 million new cars
50 billion quarts of milk	91 billion gallons of gasoline

Proposes Five Year Capital Spending Plan

Pittsburgh Steel Co. plans to finance a five year capital spending program by selling $10 million worth of additional common stock and $10 million worth of first mortgage bonds. The program: Participate with other steel producers in a Labrador iron ore project; build a sintering plant; construct two oxygen converters at the Monessen, Pa., plant; install two more rolling stands at the Allenport, Pa., hot-rolled-sheet mill; and install new furnaces and other facilities for annealing cold rolled sheets.

Forgers Extend Their Technology



Big equipment, new materials, and advanced technology are broadening the capabilities of forgers. Bigger equipment (like that in the photo) means less joining of small parts, plus the ability to make several pieces at once. New metals withstand higher temperatures. Advanced technology is bringing better utilization of forging designs. See Page 102.

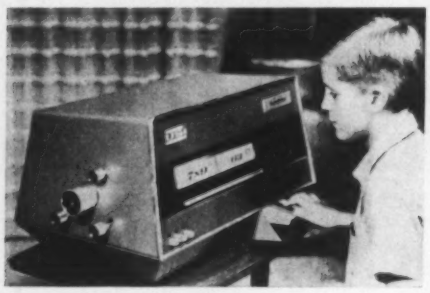
Europeans Emphasize General Purpose Machine Tools

Some 4000 machine tools from ten countries are being shown at the Seventh European Machine Tool Exhibition in Brussels, Belgium. While many automatically controlled machines are on display, the emphasis is still on general purpose equipment. Members of the European Committee for the Co-operation of the Machine Tool Industries say they are booked one to two years ahead in a booming economy that should continue at least through 1964.

Advocates Selective Import Quotas

Robert C. Sprague, chairman, Electronic Industries Association's Imports Committee, told a House subcommittee the brakes should be applied to imports "whenever they seriously threaten any segment of the American economy." Pointing out that many countries shipping electronic products to the U. S. exclude U. S. producers from their markets, he urged that quotas be placed on products or industry sectors "as the need arises."

Machine Simplifies Memorizing



U. S. Industries Inc. has developed a machine which simplifies memorizing. It is designed to help a student with associated pairs, such as dates, words, symbols. The student can take advantage of available sets of basic information, or prepare his own training program.

Apartments Capture Growing Share of Housing Starts

"Multiple dwelling units have been accounting for an increasing share of housing starts," reports the National Industrial Conference Board. Some 20 per cent of the dwellings started today are multiunit structures.

Ex-Im Bank Loans More to Venezuela

The Export-Import Bank of Washington increased a $50 million credit to Venezuela by $25 million. Purposes: To help that country liquidate obliga-

STEEL The Metalworking Weekly

September 11, 1961 Vol. 149 No. 11

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tions to U. S. manufacturers for goods delivered and to enable it to place new orders. The bank also authorized a $25 million general purpose credit, part of which will be used to aid Venezuelan firms in the purchase of U. S. equipment.

Salt Water Conversion Gets Congressional Support

Congress is ironing out differences between Senate and House bills to authorize the Interior Department to conduct a salt water conversion program. A House bill calls for a five year, $50 million program. The Senate has passed a bill which would allocate $100 million to the program over a ten year period.

How Sales of Electrical Appliances Stand

Sales of major electrical household appliances during the first seven months lagged the January-July 1960 pace. Here's the National Electrical Manufacturers' Association breakdown:

	Unit Sales, January-July 1961	1960
Electric Refrigerators	1,991,000	2,111,100
Freezers	598,200	647,300
Ranges	894,700	894,700
Water Heaters	433,600	435,300
Dishwashers	330,500	309,200
Waste Disposers	450,700	435,900
Dehumidifiers	271,000	365,500
Room Air Conditioners	1,276,300	1,277,800

Straws in the Wind

The trend to outdoor living: Commerce Department says sales of casual furniture gained 65 per cent from 1954 to 1958, while total household furniture gained only 21 per cent . . . Gray Iron Founders' Society Inc. has received funds from private industry to make a technical and economic survey of current and future uses for gray and ductile iron castings . . . Chesapeake & Ohio Railway's August earnings were the highest for any month this year. C&O's coal loadings were the best since August, 1960 . . . The Bureau of Census estimates $5.4 billion worth of new construction was put into place last month, up 4 per cent from a year ago.

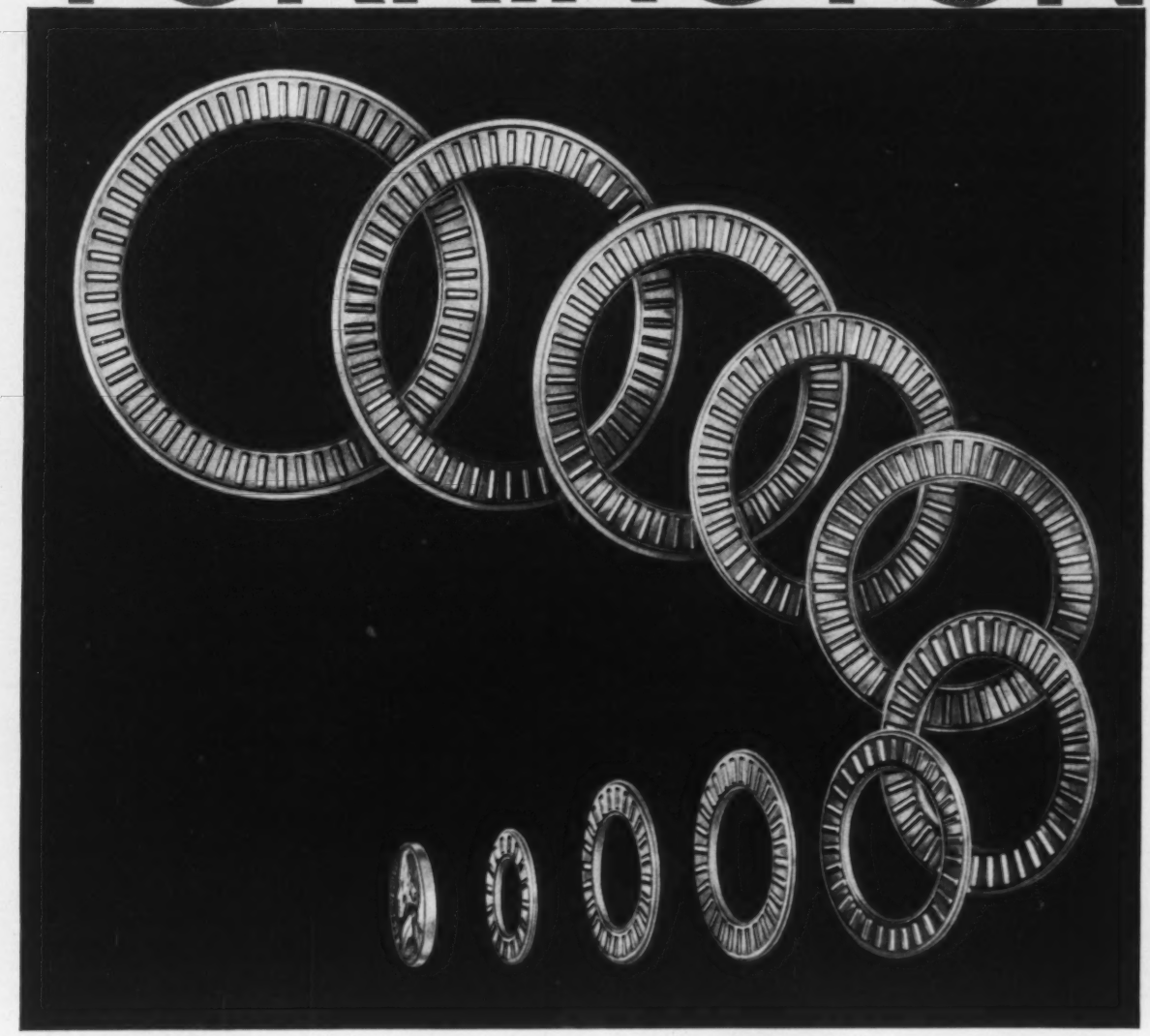
Metalworking Pulse

The Business Trend: Rising production of 1962 model autos boosted STEEL's industrial production index 6 points to a preliminary 168 for the week ended Sept. 2. **Autos:** Output was held below the 100,000 unit mark by the Labor Day holiday. Barring a major stoppage, look for production of 500,000 cars in September. **Steel:** Ingot output was up for the sixth consecutive week. The uptrend is expected to gain momentum for several weeks, barring an interruption in auto output.

- **INDUSTRIAL PRODUCTION INDEX** (1947-49 = 100)
  - Week ended Sept. 2 . . . . 168†
  - Year ago 147
  - Details on Page 75
- **PASSENGER CAR OUTPUT (UNITS)**
  - Week ended Sept. 9 . 100,000*
  - Year ago 52,635
  - Details on Page 72
- **STEEL INGOT OUTPUT (TONS)**
  - Week ended Sept. 9 2,050,000*
  - Week ago 2,030,000
  - Details on Page 142

†Preliminary. *Estimated.

TORRINGTON



SEE WHAT YOU GET IN A BEARING NO THICKER THAN A NICKEL

Torrington Needle Thrust Bearings offer true anti-friction operation, high thrust capacity, wide size range, low unit cost...all in a unit no thicker than a nickel or ordinary thrust washer.

That's not all! These exceptional bearings have an O.D. much smaller for a given shaft size than any other type of thrust bearing. You can run them on hardened and ground surfaces, or on standard races. They're completely self-contained . . . can be easily handled and installed.

Remember Torrington Needle Thrust Bearings next time you need better performance in a restricted space. Call or write us for more information.

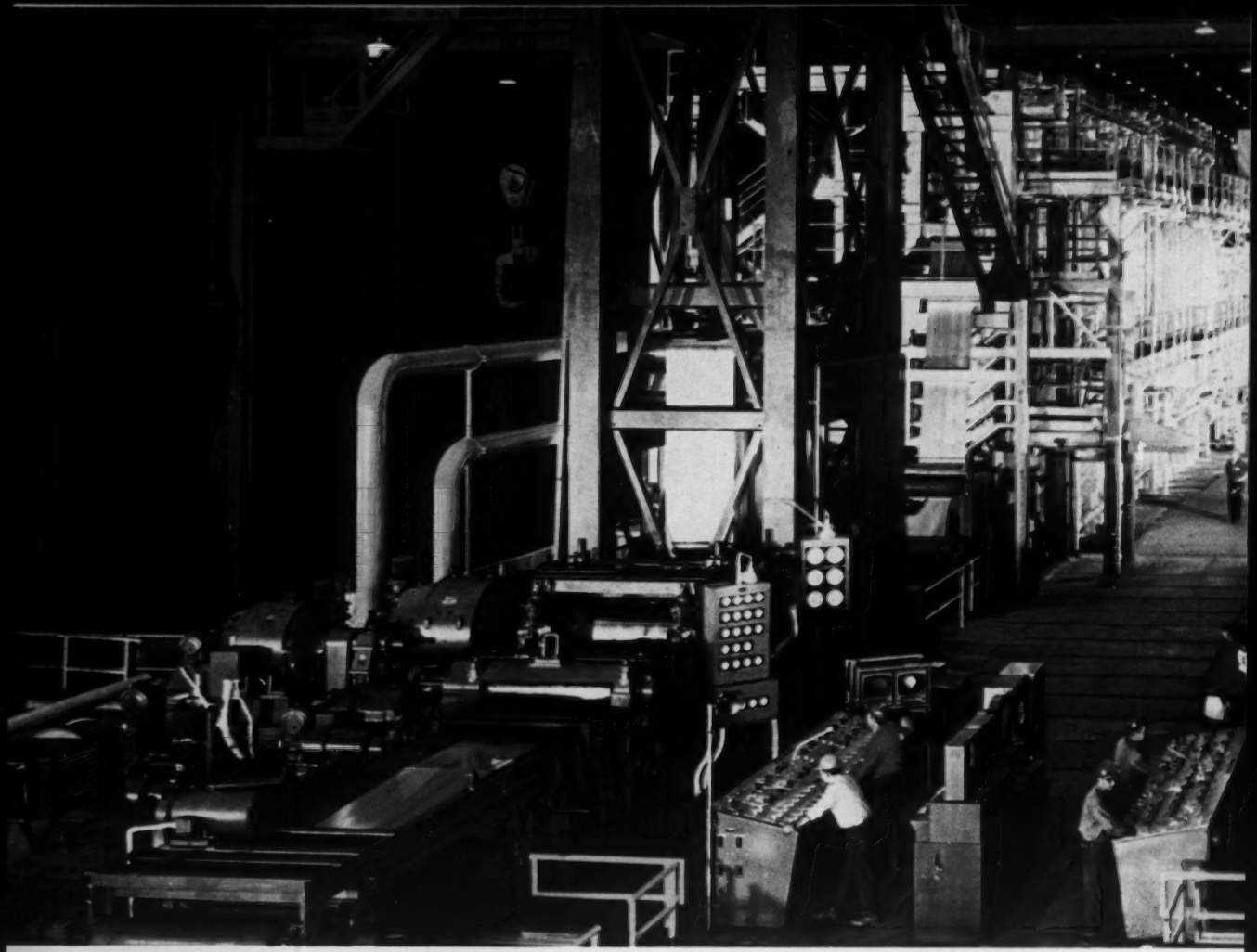
RACES IF YOU WANT THEM
Standard races are available. Otherwise Torrington Needle Thrust Bearings may be run directly on hardened and ground adjacent surfaces.

progress through precision

THE TORRINGTON COMPANY

TORRINGTON BEARINGS

Torrington, Connecticut • South Bend 21, Indiana

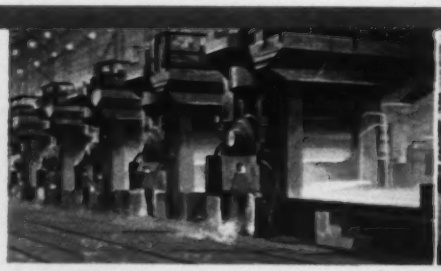


NATIONAL STEEL'S WEIRTON DIVISION

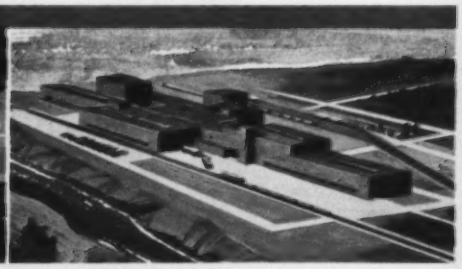
You're looking at Weirton Steel's new continuous cleaning and annealing line. This line, able to handle 2,000 feet of strip steel a minute, is among a host of strategic improvements now operative at this major National Steel division. Combined result: the fastest flow of the finest tin plate, galvanized and cold-rolled sheets ever produced by this quality steelmaker.

Weirton's new and improved facilities bolster practically every phase of production. *Example:* daily oxygen supply more than doubled through a new large-scale dual oxygen plant. *Example:* a big boost in blast furnace production and efficiency from an increase in hearth diameter, greater stove capacity and automatic stove change-over equipment. *Example:* faster output of tin plate in coils through a new 4,000-foot-per-minute side trimming line. *Example:* greater speed in the production of cold-rolled steel through a new four-stand tandem cold reduction mill. *Example:* even more capacity for making tin plate through two new electrolytic tin-plating lines.

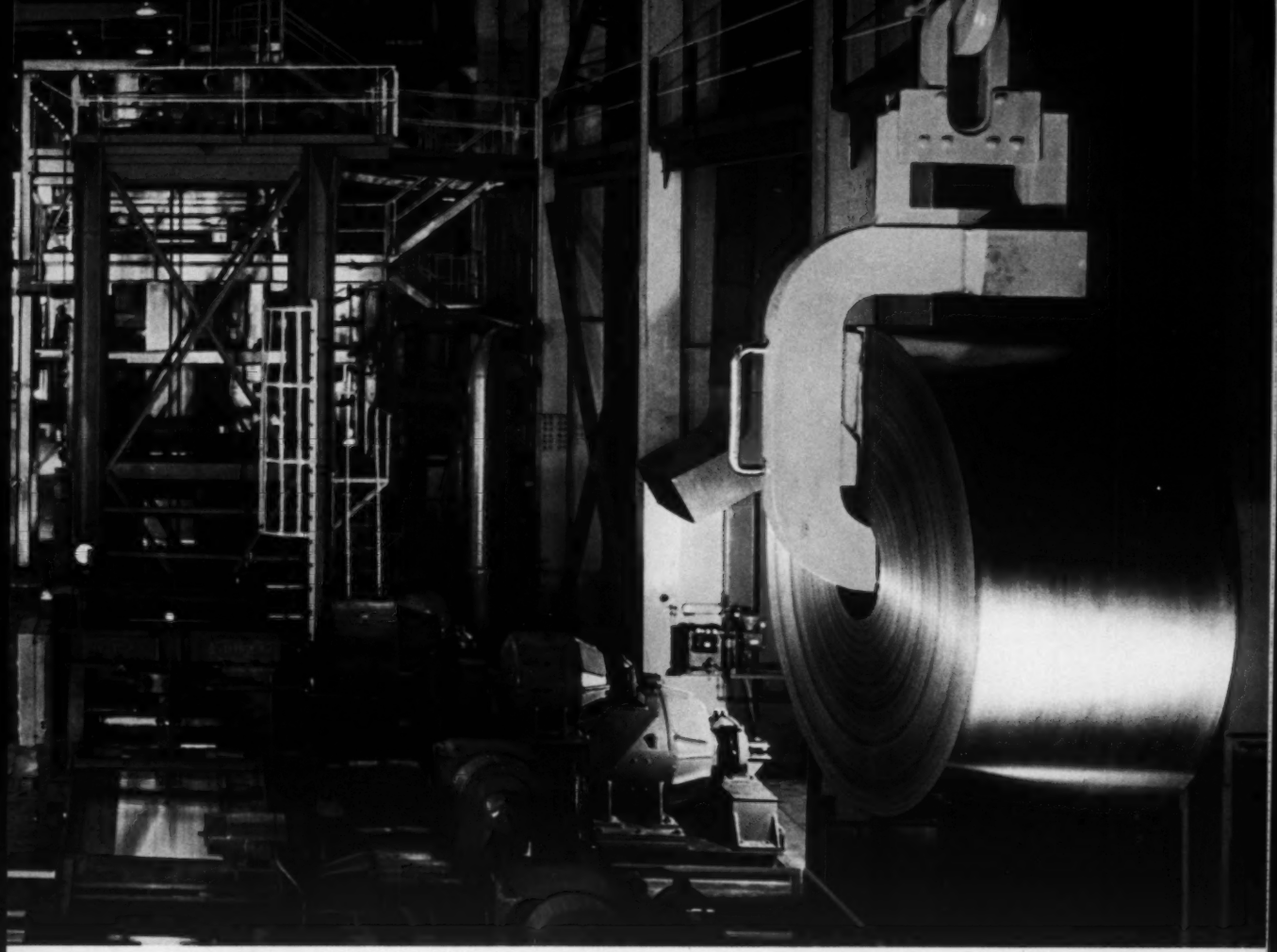
FIVE OTHER MAJOR STEPS TO FURTHER PROGRESS



AT GREAT LAKES STEEL in Detroit, the computer-controlled and operated 80" Mill of the Future—fastest, most powerful hot-strip mill in the world—is providing more and better automobile body sheets.



AT MIDWEST STEEL near Chicago, the most modern and efficient steel finishing plant in existence will provide industry with the finest quality tin plate, galvanized sheets, hot- and cold-rolled sheets.



FLEXES NEW STEELMAKING MUSCLES

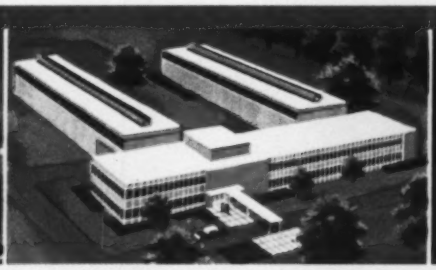
Yet Weirton's greater steelmaking capability is just *one* accomplishment in a program of expansion and improvement in which we are investing well over $300,000,000. This program means more than a better supply of the highest, most uniform quality of steel for our customers. It means more secure jobs for our employees and better values for you, the ultimate consumer of the million and one products made of steel. Other phases of this program will swing into action soon. And we will be bringing you news about them too.

NATIONAL STEEL CORPORATION, PITTSBURGH, PA.

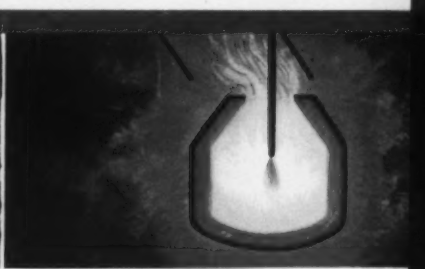
SUBSIDIARIES AND DIVISIONS:

GREAT LAKES STEEL • WEIRTON STEEL • MIDWEST STEEL • STRAN-STEEL • ENAMELSTRIP • HANNA FURNACE • NATIONAL STEEL PRODUCTS

AT STRAN-STEEL in Terre Haute, new finishing-line facilities are boosting quality and output of popular color-coated steel panels for Stran-Steel's handsome new line of contemporary pre-engineered buildings.

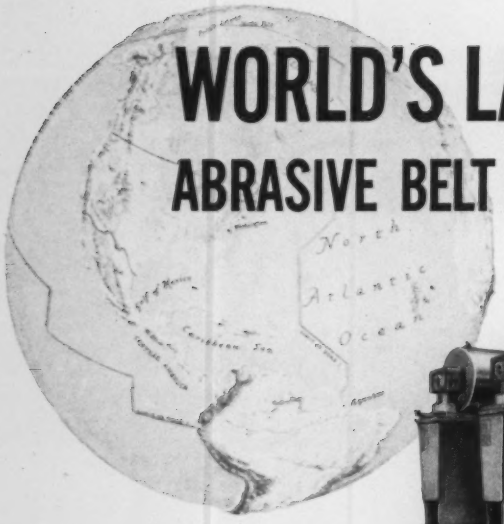


NEW RESEARCH CENTER at Weirton, W. Va., will be National Steel headquarters for the continuing exploration of new and better raw materials, facilities, manufacturing processes and products of steel.



NEW BASIC OXYGEN FURNACES at Great Lakes Steel. Construction will start in 1961 on two basic oxygen furnaces — the largest ever built — which will add new capacity and greater efficiency.

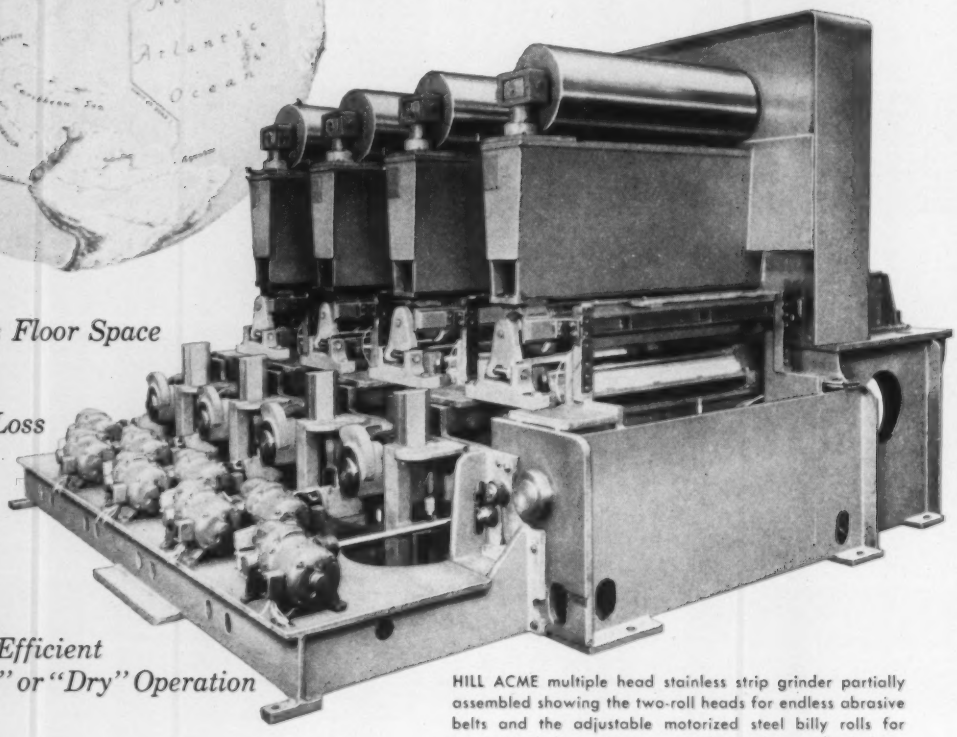
WORLD'S LARGEST MULTIPLE HEAD ABRASIVE BELT GRINDER by Hill Acme Co.



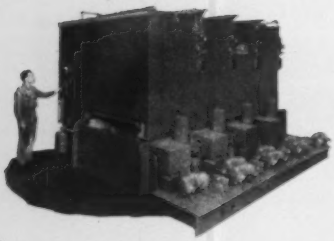
★ *Saves Floor Space*

★ *Reduces Material Loss*

★ *Equally Efficient for "Wet" or "Dry" Operation*



HILL ACME multiple head stainless strip grinder partially assembled showing the two-roll heads for endless abrasive belts and the adjustable motorized steel billy rolls for increasing belt pressure against the steel strip. The belt on any head can be changed while others are in operation.



HILL ACME four head grinding and polishing machine for the progressive finishing of stainless steel strip. This unit will process material .010" to .250" thick and 50" wide and produce up to No. 4 finish.

This four head HILL ACME abrasive belt grinding and polishing machine requires only half the floor space of four conventional strip grinders. The flexible design permits the addition of any desired number of heads.

For heavy stock removal "wet" grinding is recommended with 600 GPM coolant. Sludge passes through the bottom of the machine to the filter unit. Tests prove that considerable less coiled material is lost than in previous methods. A built-in oil mist spray system is used in polishing operations. Rubber covered guide rolls, built into the machine, create the proper "break" angle of the strip over each billy roll to flatten the strip at the point of contact with the abrasive belt. The billy rolls are actuated vertically by hydraulic power to overcome the tension on the steel strip.

This unit is the result of thirty years of success in producing endless abrasive belt grinding and polishing machines for all types of ferrous and non-ferrous materials.

Complete details are available.

The HILL ACME Company

Also Manufacturers of:

"HILL" Grinding and Polishing Machines • "ACME" Forging Machines • "CANTON" Rotary and Alligator Shears • BAR-BILLET Shears • MATERIAL HANDLING Equipment • "CLEVELAND" Knives and Shear Blades • KLING Metal Working Tools.

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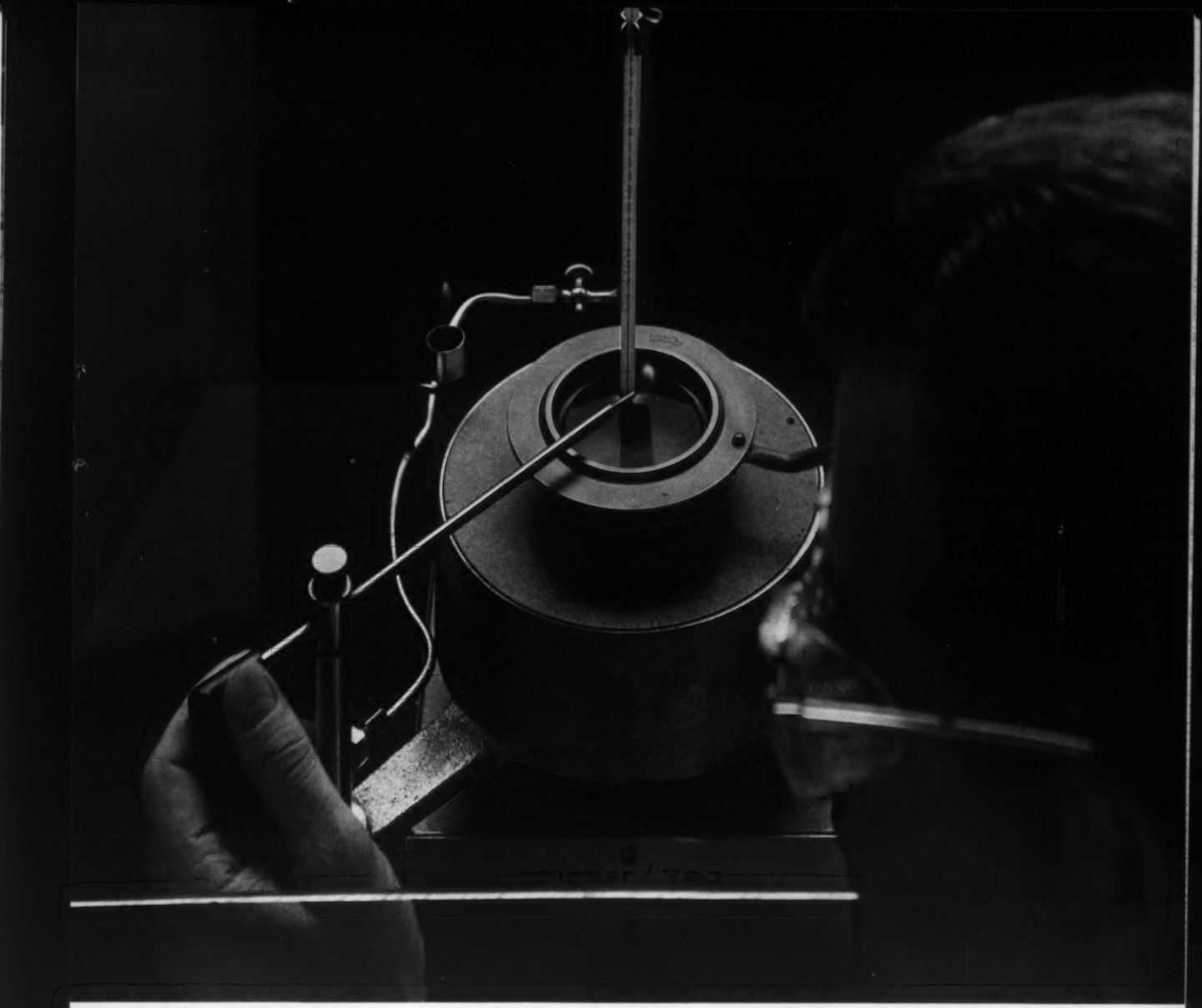


SAFETY SOLVENT HAS NO FIRE OR FLASH POINT

CHLOROTHENE® NU solvent, by providing an answer to both of the chief hazards of common cold-degreasing solvents, is leading a breakthrough in the solvent cleaning of many materials. Having *no* measurable fire or flash point by standard methods, it is completely removed from the flammable class of cleaning compounds. At the same time, it has the desirable characteristics of the nonflammable compounds and less toxicity than other chlorinated solvents. Maximum allowable vapor concentration of Chlorothene NU solvent is a high 500 ppm, compared to carbon tetrachloride at 25.

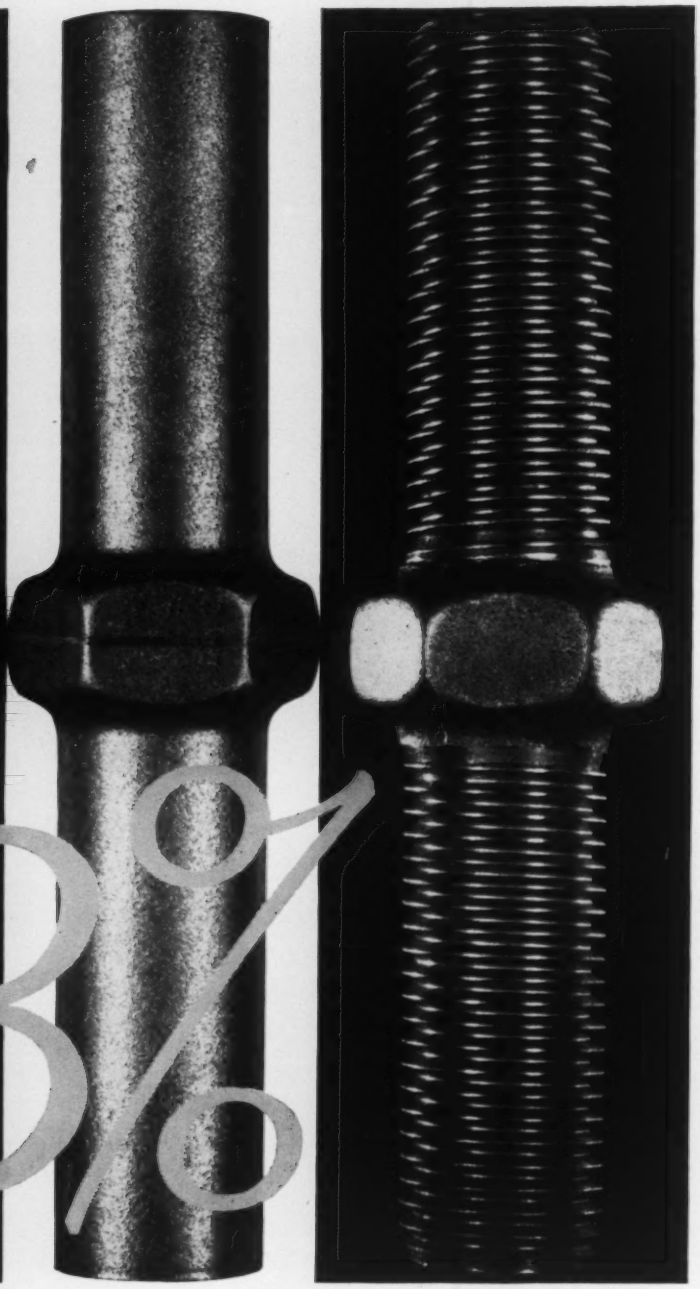
Chlorothene NU specially inhibited 1,1,1-trichloroethane is easily recovered by distillation. It has an excellent low-corrosion record, too. Effective by spray, dip, bucket, or wiping methods, it can be used safely on most electric motors, instruments, all common metals including aluminum, zinc, corrosion-prone "white-metal" alloys, and many plastics.

Use Chlorothene NU in *your* cold degreasing. Contact your distributor of Dow solvents for complete information about its safety features, uses, recovery and cost. Ask him about Dow trichloroethylene, perchloroethylene and methylene chloride, too. Or get in touch with your nearest Dow sales office.

SEE YOUR DISTRIBUTOR OF DOW SOLVENTS FIRST!

THE DOW CHEMICAL COMPANY DOW Midland, Michigan

At CHAMPION ...Upset Forging Cuts Adjusting Screw Cost 28%



Upsetting of the hexagonal section in the center of this adjusting screw cut finished cost 28% compared to that hogged from hexagonal stock. The finished forging is stronger, too... upsetting increases strength by directioning the metal grain flow to match the shape of the part.

Check your products for parts that might be upset forged... then call —

SINCE 1895

THE CHAMPION RIVET COMPANY

CLEVELAND 5, OHIO • EAST CHICAGO, INDIANA • T. P. CHAMPION, President

When it's a vital part, better make it FORGED

TENZALOY

Tenzaloy Aluminum for high-strength castings without heat treatment

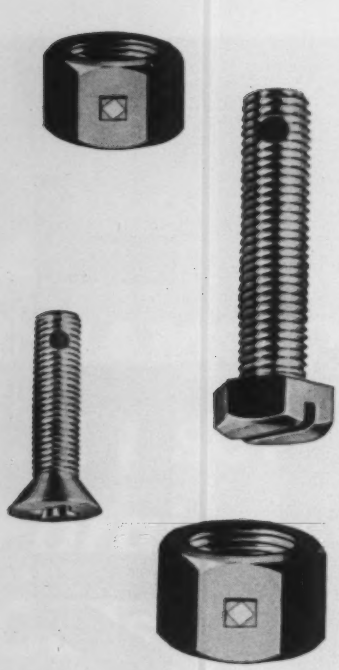
When you need a high-strength aluminum casting your alloy should be self-aging Tenzaloy — particularly if you want to avoid heat treatment. *Tenzaloy has this unique combination of properties:*

1. High yield and tensile strength
2. Exceptional machinability
3. Remarkable dimensional stability
4. High impact and shock resistance
5. Excellent corrosion resistance
6. Permanent, silvery-white finish

Tenzaloy castability is excellent in green sand, plaster, investment, shell, oil-bonded sand and permanent molds of all kinds. It is particularly suited to designs where load-carrying capacity, impact strength and light weight are essential, and it is used in applications where heat treated aluminum alloys, cast iron or other materials might otherwise be selected.

Write for your copy of Bulletin 103R5 to: Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, N. Y.

ASARCO



SOLVE FASTENER PROBLEMS CAUSED BY SHOCK OR VIBRATION...

SIMPLIFY ASSEMBLY with Republic NYLOK® Bolts and Nuts

Applications are unlimited for rugged, self-locking Republic NYLOK® Bolts and Nuts. They lock tight—seated or not—to simplify assembly, solve a wide range of design and engineering problems caused by shock or vibration.

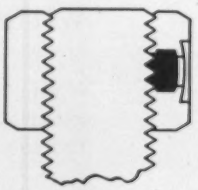
Single-unit NYLOK Bolts and Nuts are easy to apply manually or automatically, can be used over and over. NYLOK Nuts are double-chamfered to permit automatic feeds at top production speeds, save time and money.

Check your product for applications where NYLOK's positive holding power can do the job better, save you money. For sizes, prices, and application data on NYLOK Bolts and Nuts, contact your Republic Dealer, or send the coupon.

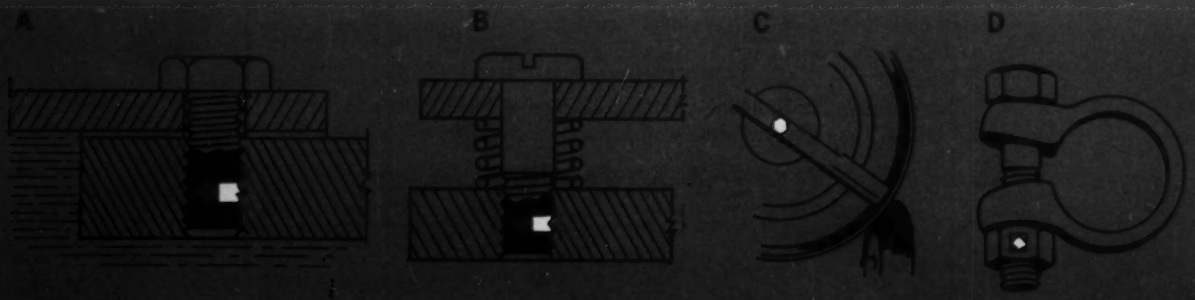
Steel Strong, Modern, Dependable

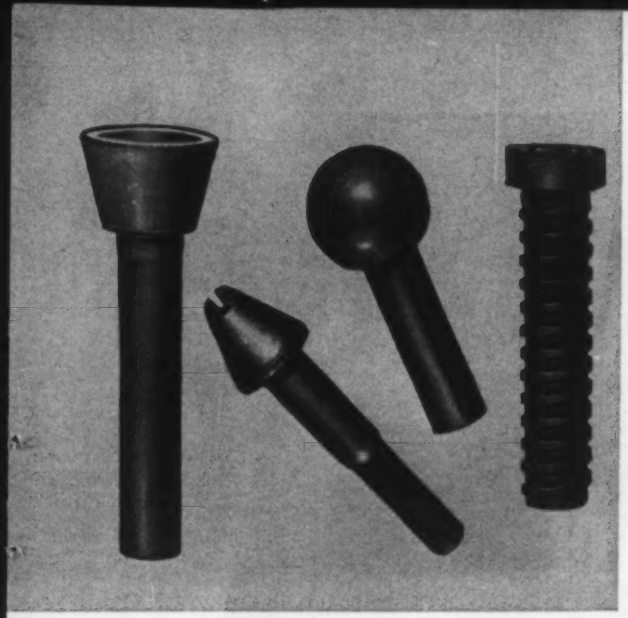
NYLOK'S SUPER-LOCKING SECRET

is its nylon plug, firmly staked into one of the faces of the cold forged hex nut, or into the body of the bolt. The plug has a plastic memory—or a natural tendency to recover its original shape and "grow" into opposite mating threads. This forces tight metal-to-metal contact for a vibration-proof lock that can't shake loose.



Typical NYLOK applications: (a) NYLOK Bolt as a fastener-sealer to effectively block fluid escape along thread path; (b) NYLOK Bolt used to solve tension or vibration fastening problems; (c) NYLOK Nut used to secure lawnmower rotor blade under severe vibration conditions; (d) NYLOK Nut employed to lock tight against pressure of a spring-clamp.



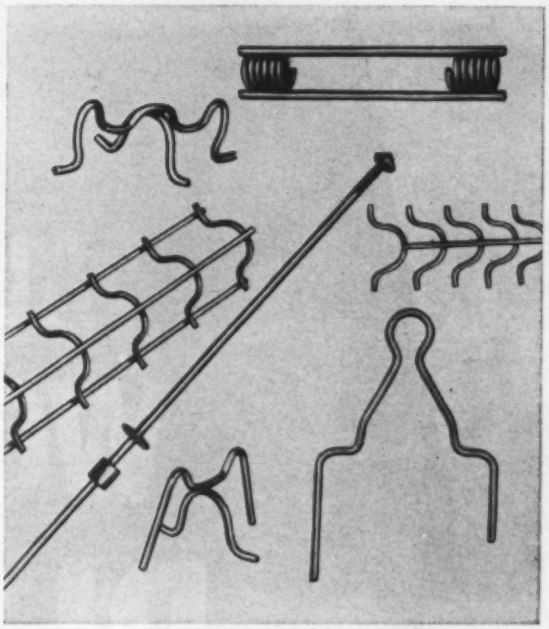


PROBLEM-SOLVING KNOW-HOW and EXPERIENCE have made Republic a leader in custom production of Fastener and Formed Parts "Specials." Whenever standard fasteners or formed parts can't do the job, you'll save time and money by contacting Republic.

Republic will handle the complete job—design, engineering, and production—or any phase of it. Extensive capabilities result from modern forming, extruding and upsetting equipment —plus complete machining, heat treating, and surface finishing facilities. Send coupon for data.

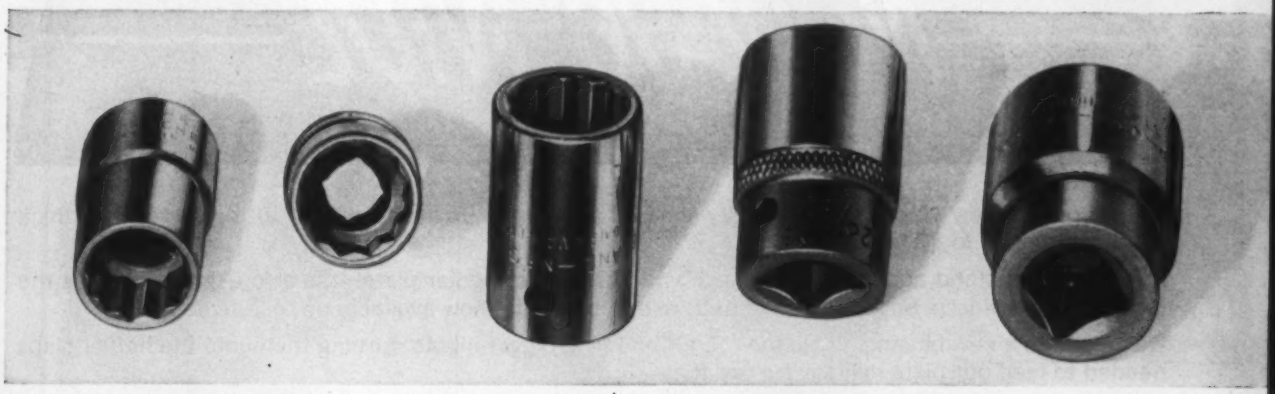
SUPERIOR STRENGTH, TOUGHNESS, and MACHINABILITY of Republic Cold Finished Alloy Bars enable Herbrand Division of the Bingham-Herbrand Corporation, Fremont, Ohio, to make a better product at lower cost.

In the production of wrench sockets, bars are formed, drilled, and cut off in an automatic screw machine, then hot broached to shape internal diameter and contour. Final stages of socket production include heat treat and chrome plating. Mail coupon for more data on Republic Alloy Bars.



ACCURATE, EASY-FORMING CHARACTERISTICS of Republic Manufacturers' Coarse Wire have simplified production and helped keep prices competitive on masonry construction accessories made by Meadow Steel Products Inc., Birmingham, Alabama.

Using Republic's free metallurgical services, Meadow determined the best wire for each product application, applied cost factors, and now makes more than 20 different parts from relatively few different types of Republic Wire. Result: reduced inventory requirements, lower manufacturing costs. Send for information on Republic Wire and Wire Metallurgical Services.



REPUBLIC STEEL

REPUBLIC STEEL

REPUBLIC HAS THE FEEL FOR MODERN STEEL

REPUBLIC STEEL CORPORATION
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Send more information on:

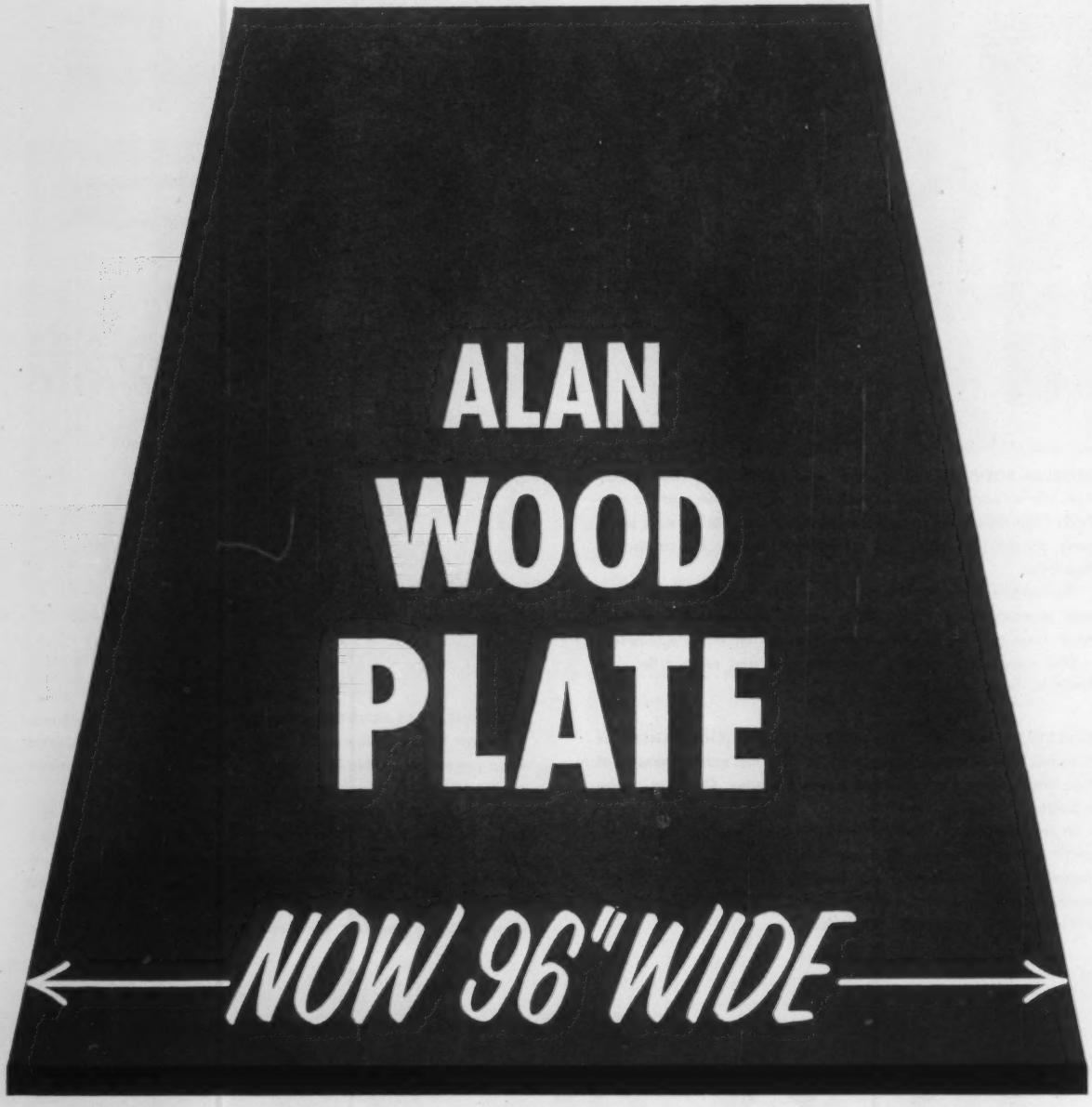
- ☐ Manufacturers' Coarse Wire
- ☐ NYLOK Nuts and Bolts
- ☐ Cold Finished Alloy Bars
- ☐ Fastener and Formed Parts "Specials"
- ☐ Have a Wire Metallurgist call

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____



Now—from our new wide plate mill-quality sheared plate up to 96 inches wide . . . or up to 4 inches thick . . . in lengths up to 80 feet.

A unique third stand adds improved finish and flatness to regular plate. It is also used to impress the familiar and exclusive Super Diamond pattern on floor plate, now available up to 2 inches thick.

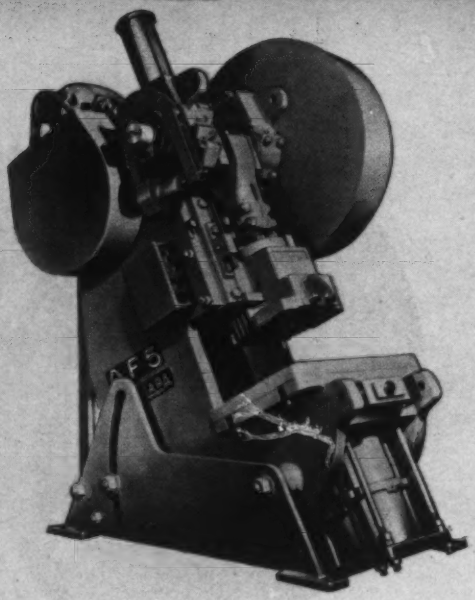
We've added a new blooming mill, too . . . for handling bigger ingots, turning them into the heftier slabs needed to feed our plate mill's extra capacity.

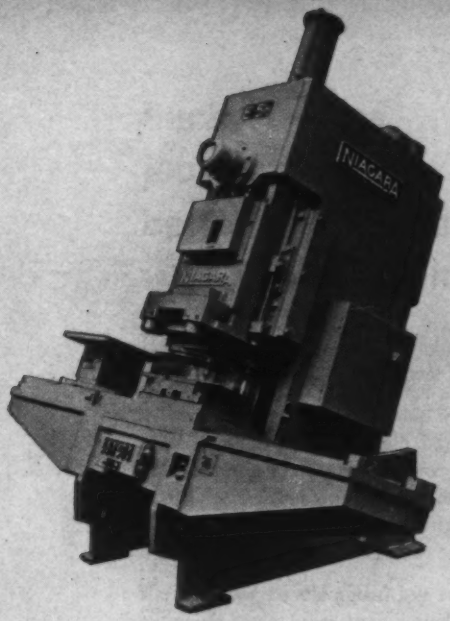
These new mills are part of Alan Wood's $36-million expansion program . . . creating new and better ways to serve you. Let us supply your steel needs.

ALAN WOOD STEEL COMPANY

Conshohocken, Pa. • STEEL PRODUCERS WITH THE CUSTOMER IN MIND

Plates (Carbon, Alloy, Hi-Strength) • Cold Rolled Sheet and Strip • Hot Rolled Sheet and Strip (Carbon, Alloy, Hi-Strength) • "A. W." Super Diamond Patterned Floor Plate • "A. W." Algrip Abrasive Rolled Steel Floor Plate • "A. W." Iron Powder • "A. W." Pig Iron • Foundry and Industrial Coke • Coal Chemicals Mine Products • "Penco" Lockers, Cabinets and Shelving.

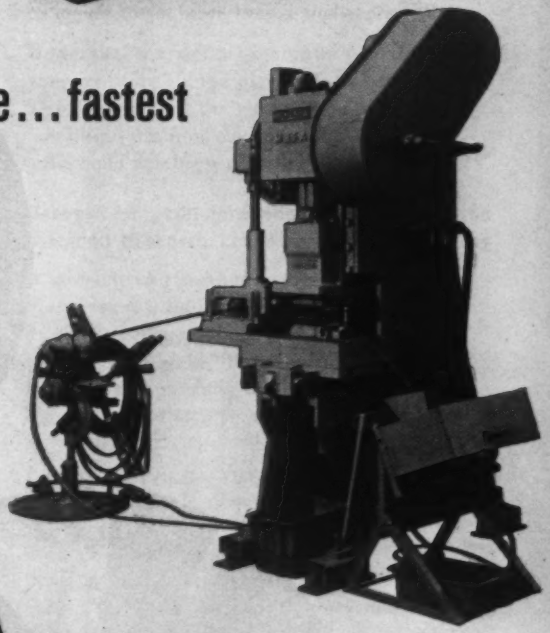




largest selection...

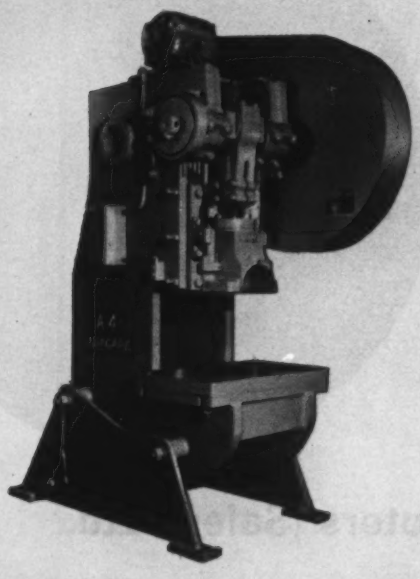
best engineered...thriftiest to operate...fastest

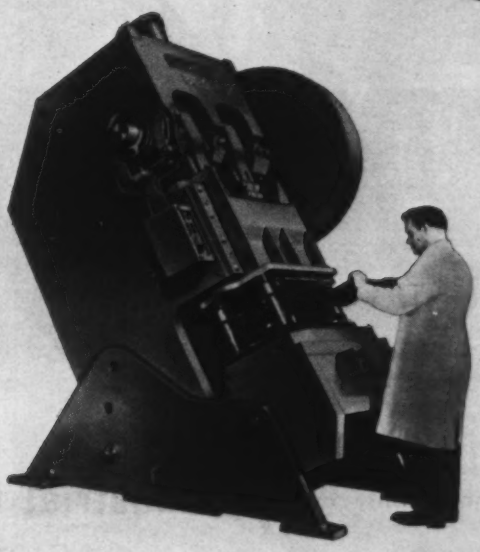
Versatility makes the OBI the most popular press in the metal stamping industry. And the most popular make is NIAGARA . . . for good reasons. Niagara offers the most complete selection . . . 8 basically different lines, from simple designs for single stroke work to fully equipped press packages for automatic production. Speeds up to 1200 spm. A tonnage range from 5½ to 250. Choice of air friction, air sleeve or mechanical sleeve clutches. Single or double crank designs. Front-to-back or conventional left to right crankshaft. An unequalled variety of accessories and automatic devices for every job requirement. Send for Handbook 203 to find the Niagara OBI's best suited to your production needs.



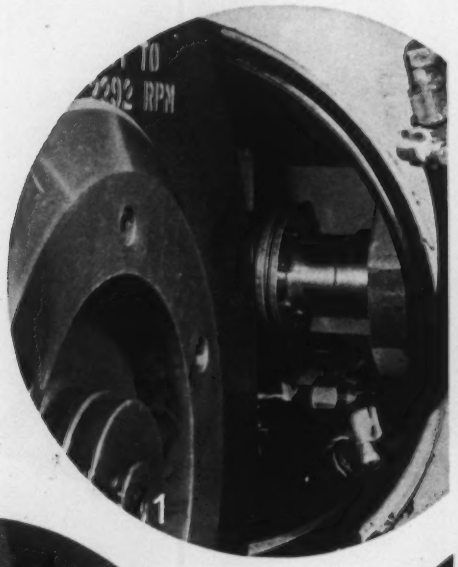
NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.
District Offices and Distributors Everywhere

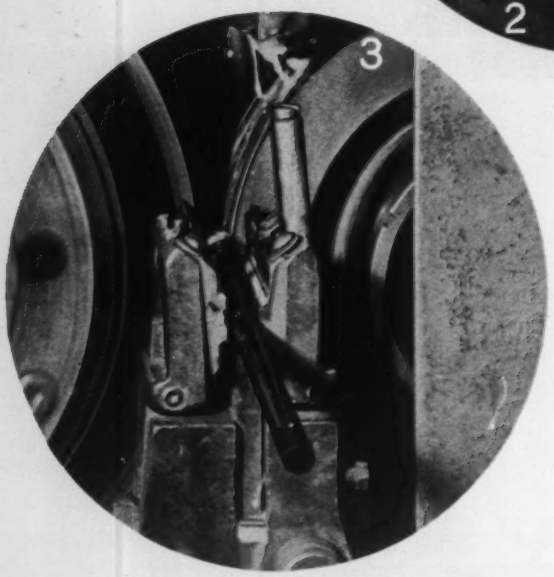
NIAGARA OBI's

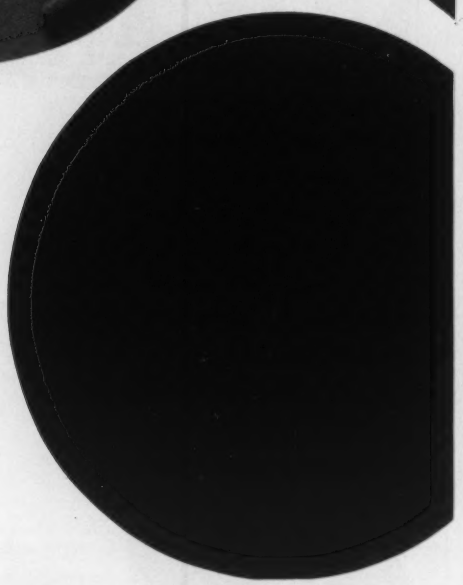




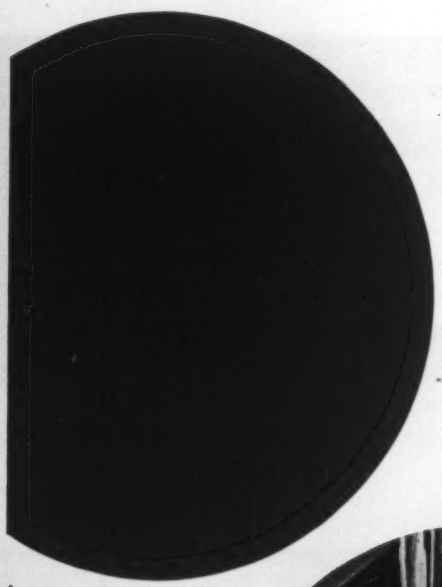
America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work.

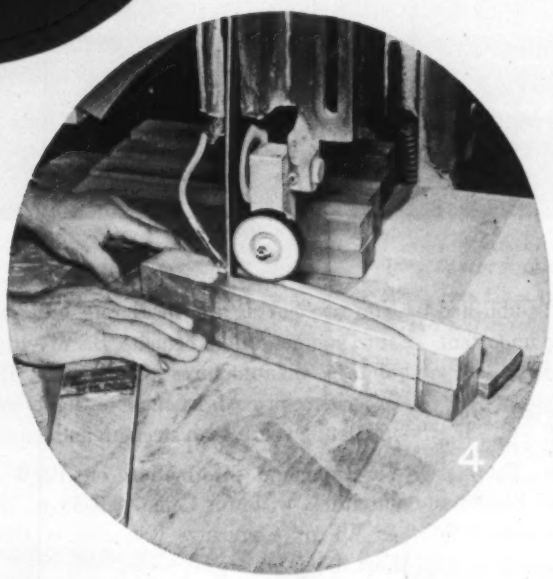






Industrial Distributors (Sales), Ltd.





Each of these jobs is done better and cheaper with natural diamonds

Here are four cutting and grinding operations being performed with industrial diamonds.

Three of them were once done with other kinds of tools. One couldn't be done at all, were it not for the unique *combination* of properties that only diamonds possess—excellent cutting ability coupled with fantastic endurance.

Result: your people spend less time changing tools, more time actually producing.

If you cut, sharpen or smooth in your business, you can probably use diamonds to advantage. Test them against the method you're using. You'll find out how efficient – and economical – a diamond can be, especially now.

Best grit for metal-bond wheels developed by the Diamond Research Laboratory in Johannesburg

A new impact crushing method for natural diamonds is producing the strongest and most durable diamond grit ever obtained for metal-bond wheels. Your tool and wheel manufacturer is ready to help you select the diamond tool that's right for *your* job.

1 **Dressing Grinding Wheels** *that groove propeller shafts for Evinrude Motors, Milwaukee. Cutters are powdered metal matrix impregnated with small, blocky natural diamonds. They show no wear after months of use.*

2 **Boring and Facing Aluminum** *pinion carriers for Chrysler Corporation, Detroit. Dimensions are held within ±.001 inch, producing finishes to 20 microinches. Conventional tools could not withstand aluminum's abrasiveness, nor meet these tolerances.*

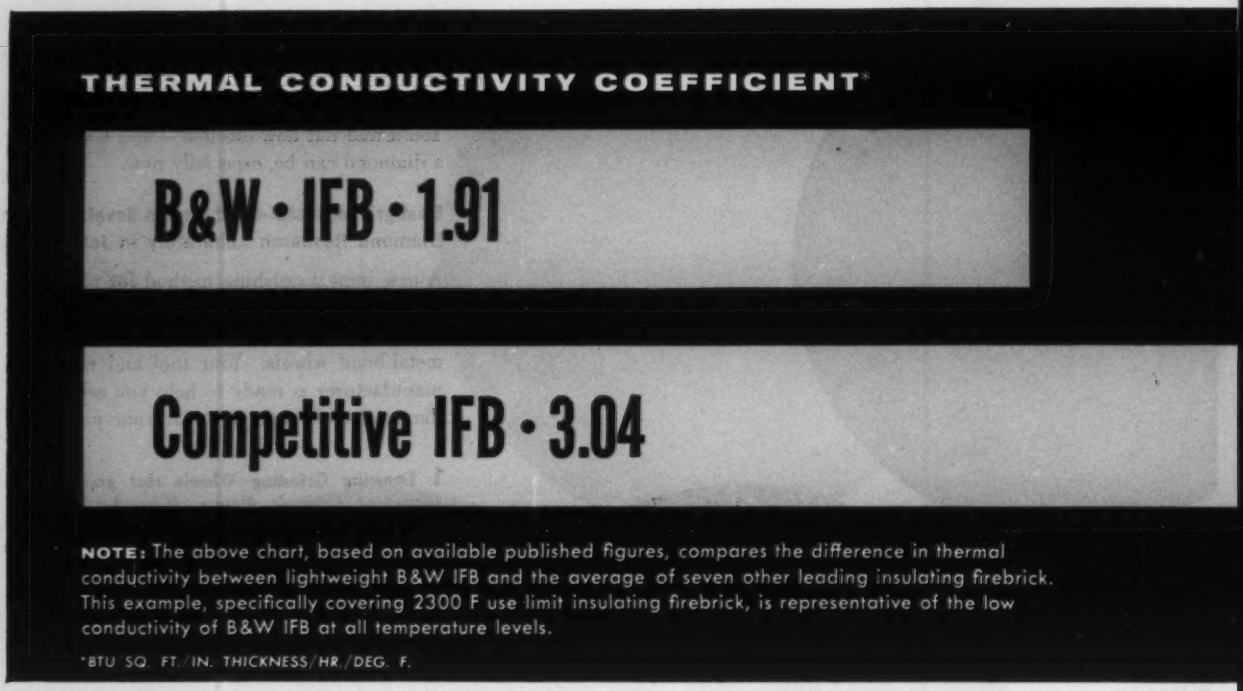
3 **Grinding Synthetic Sapphire** *and quartz rods with diamond grinding wheel. Tolerances for diameters: ±.0002 inch; concentricity: ±.0002 inch. After trying every other grinding method, this diamond-coated unit was installed by Duncan-Inglewood, Inc., Inglewood, Calif. Rods are now being turned out on a production basis.*

4 **Band-Sawing Optical Glass.** *New diamond-coated band-saw blade cuts optical glass to pattern shapes at Dia-Chrome, Inc., Glendale, Calif. Diamond band saw can also cut reinforced plastics, ceramics, marble. Thin materials can be cut without coolant; dense materials require water or water-oil emulsion.*

Industrial diamonds cut practically everything . . . especially your production costs

Another *plus* of Lightweight B&W Insulating Firebrick

LOWER THERMAL CONDUCTIVITY means



NOTE: The above chart, based on available published figures, compares the difference in thermal conductivity between lightweight B&W IFB and the average of seven other leading insulating firebrick. This example, specifically covering 2300 F use limit insulating firebrick, is representative of the low conductivity of B&W IFB at all temperature levels.

*BTU SQ. FT./IN. THICKNESS/HR./DEG. F.

All insulating firebrick are not the same. Published figures show wide variations in *all* of the important properties among the leading brands of IFB.

Take thermal conductivity. This important property affects fuel costs, temperature control and the speed with which a furnace heats and cools. Thermal conductivities range from a B&W low of 1.91 to a high of 3.47 for a competitive IFB—*almost a 100% difference in wasted heat and fuel costs.*

You are paying for insulating firebrick . . . make sure you get *all* the benefits. B&W—the originator of IFB—manufactures a full line of IFB with an experience-proved balance of light weight, high insulating value, high strength and long life.

For complete information on B&W Insulating Firebrick, write for Catalog R-38 to The Babcock & Wilcox Company, Refractories Division, 161 East 42nd Street, New York 17, N. Y.

ONE OF A SERIES

LOWER FUEL COSTS

the payoff

- **14% lower fuel costs • 30 F lower casing temperature**
- **25% less time to reach operating temperature • 12 hours saved per cycle**

These are the results of a direct comparison of two furnaces of the type shown above, one lined with B&W IFB and the other with one of the better competitive insulating firebrick. That's how B&W pays off for a major steel company in their 8-stack, hood type, strip annealing furnaces. This is just one of many proofs in our files that "there is an important difference in insulating firebrick."

B&W

THE BABCOCK & WILCOX COMPANY

REFRACTORIES DIVISION

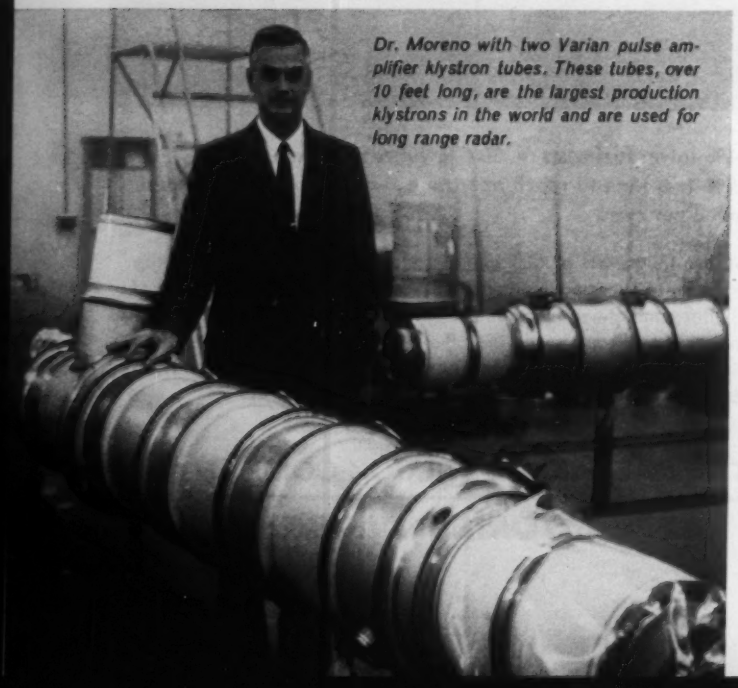
R-658

Lindberg atmosphere generators help VARIAN maintain rigid standards in volume production

Dr. Theodore Moreno, Vice President, Tube Division, Varian Associates, Palo Alto, California. Varian Associates is one of the country's foremost producers of equipment for a wide number of fields such as communications, navigation and aircraft control, advanced defense systems including early warning radars, and missile guidance, detection and ranging. Many Varian developments represent important advances in electronic technology.

QUOTE from Dr. Moreno

"Varian's success in the wide variety of electronic fields it serves depends not only on its ability to develop a technologically superior product but also on the development and maintenance of the production standards and capabilities required to retain this superiority in volume production. Our Lindberg Atmosphere Generators are making an efficient and dependable contribution to the consistent maintenance of these highly precise production standards."



Dr. Moreno with two Varian pulse amplifier klystron tubes. These tubes, over 10 feet long, are the largest production klystrons in the world and are used for long range radar.

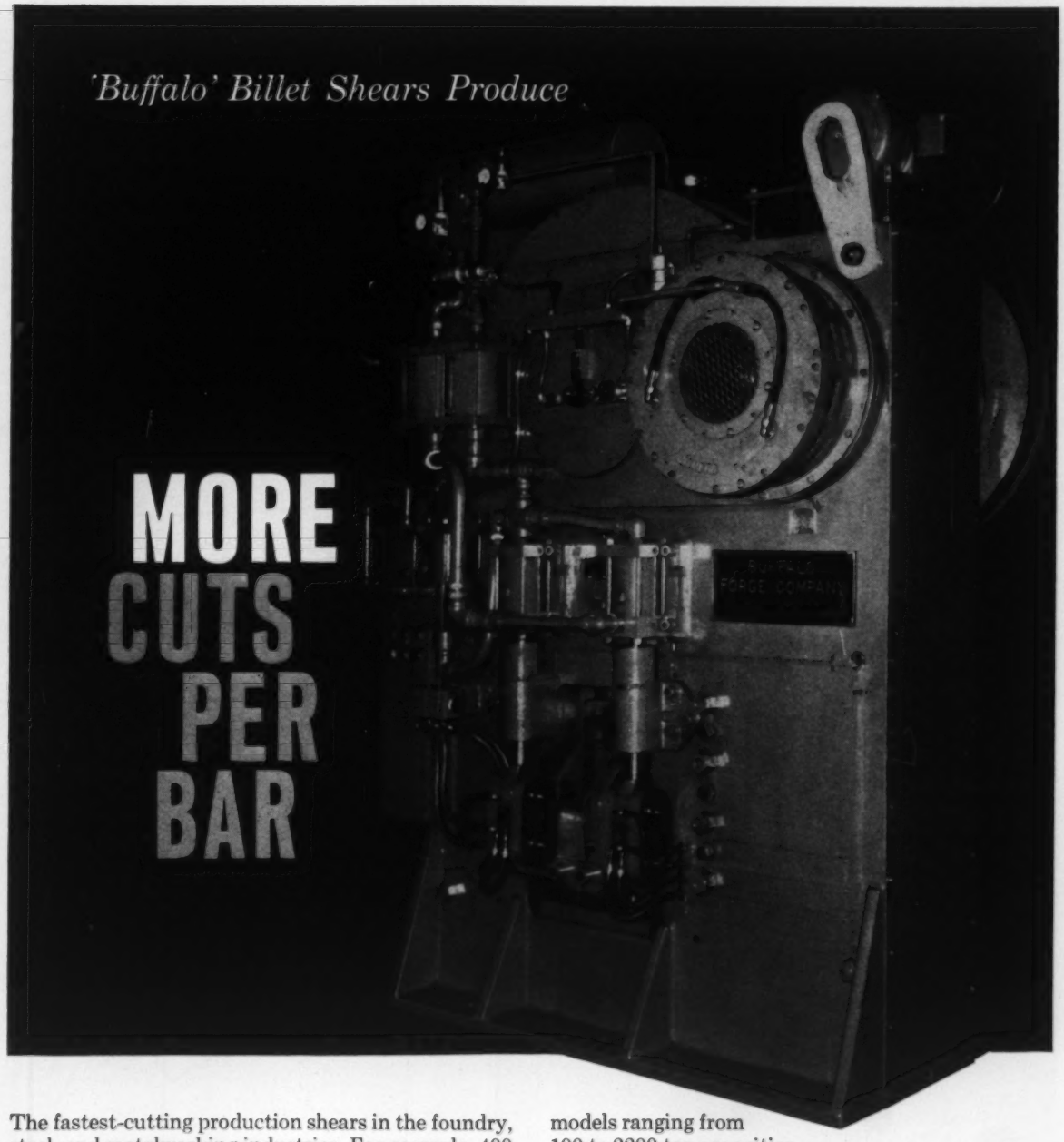
Four Lindberg Atmosphere Generators are used at Varian Associates to provide dissociated ammonia atmospheres used in the production of microwave tubes. These include units with 1000 cfh, 2000 cfh, and 4000 cfh capacities. Varian also uses five Lindberg Furnaces for various research and production requirements. Lindberg has pioneered in practical equipment for producing all types of atmospheres for the treatment of metals and ceramics. If your product or processes need the application of atmospheres talk it over with Lindberg. Call your Lindberg Field Engineer (see your classified phone book) or write us direct. Gas Process Division, Lindberg Engineering Company, 2441 W. Hubbard St., Chicago 12, Ill.

Los Angeles plant: 11937 S. Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg Ltd., 15 Pelham Ave., Toronto 9, Ont. Also, Lindberg plants in Argentina, Australia, England, France, Italy, Japan, South Africa, Spain, Switzerland and West Germany.

LINDBERG
heat for industry

'Buffalo' Billet Shears Produce

MORE CUTS PER BAR



The fastest-cutting production shears in the foundry, steel, and metalworking industries. For example, 400 ton model (illustrated) can produce up to 18,000 clean, square cuts (alloy steel) per eight hour shift.

Equally important... unique hold down and work support assure *maximum* number of cuts per bar with fewer rejects and minimum amounts of "unused" stock. Billets only 1½ times as long as their diameter can be cut in half... at full capacity in mild steel.

'Buffalo' Billet Shears are available in 8 standard models ranging from 100 to 2200 ton capacities. Rams are high strength alloy steel... adjustable knives are easily removed from rear of machine for sharpening.

Standard models include automatic air-operated oiling system, electrical equipment, and set of knives for round or square billets. Automatic feed tables are optionally available. Your 'Buffalo' Machine Tool dealer will be glad to furnish complete details. Or, write address below for Bulletin 711.

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

MACHINE TOOL DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

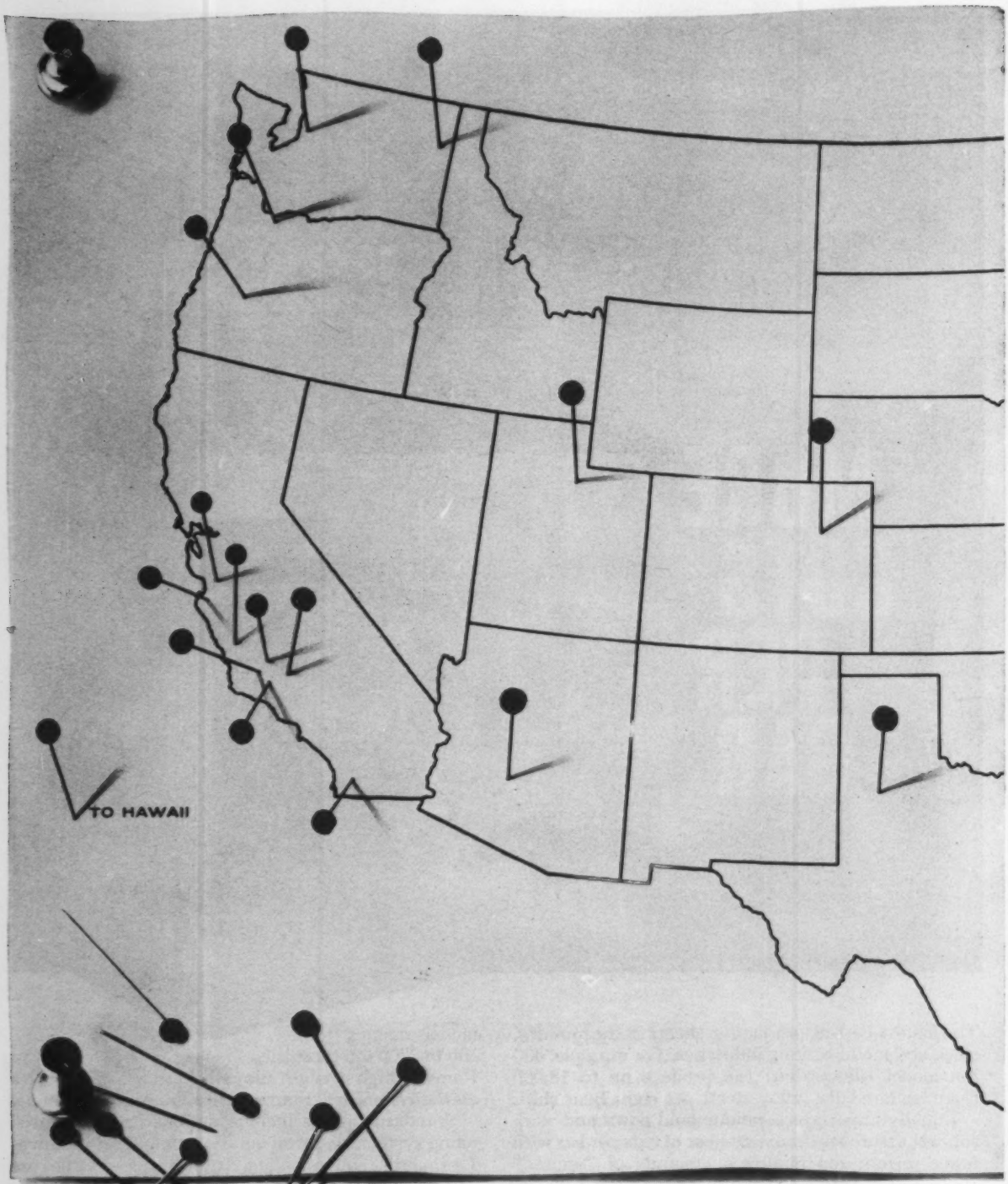
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

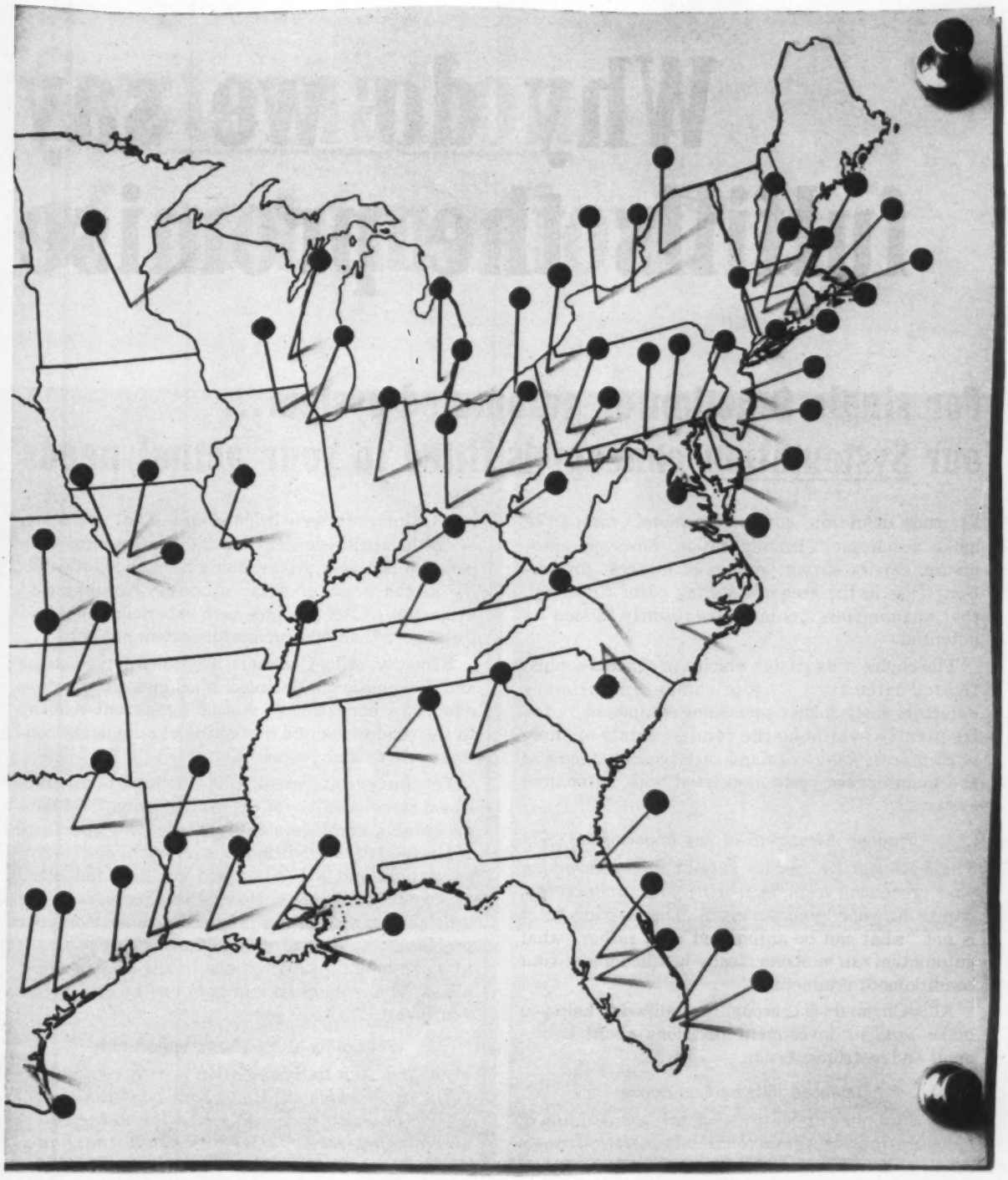
'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.



Pin-pointed supply

Wherever you are, Eastern Stainless Steel is close by. Whatever you may need to meet your schedules, it will be sped to you from one of Eastern's supply centers in 83 cities. Whenever you need stainless sheet, plate, coil or strip, Eastern will see that you get it. Phone, teletype or visit Eastern Stainless where your delivery dates are our chief concern; your satisfaction, our chief aim.



FREE BOOKLET—Full color, 16 pages. Useful data on stainless steel . . . types, size range for converted plates, Sendzimir and handmill limitations, finishes available, etc. Send coupon now for your free copy.

EASTERN STAINLESS STEEL
BALTIMORE 3, MARYLAND

Eastern Stainless Steel
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Why do we say fulfills the promise

For single function or automated system... our Systemation concept is fitted to your actual needs

In crude definition, automation merely means "to make automatic." In implication, however, automation carries strong promise of low-cost production. It is in the area of lowering costs, some feel, that automation has most frequently missed its potential.

The engineering genius which can concoct sophisticated circuitry . . . join computers, primary detectors, instruments, processing equipment . . . too frequently overlooks the fundamentals of thorough *process knowledge* and such basic problems as the maintenance costs associated with automated systems.

Prudent investment of key importance

The *Systemation* concept is built around lowering *your* processing costs, increasing *your* productivity, improving *your* quality control. The starting point is not "what can be automated" but rather "what automation can be economically justified under your conditions of production."

Allis-Chalmers is thoroughly qualified to help you make *prudent* investment decisions about equipment and instrumentation.

Balanced judgment in depth

Long a supplier of control systems, a broad line of industrial processing and electrical generation, transmission, distribution and utilization equipment, A-C has an intimate knowledge of industrial processes. With the acquisition of Consolidated Systems Corporation last year, Allis-Chalmers extended its ability in the areas of data gathering, handling and utilization. CSC provides such experience acquired from more than 500 successful system projects.

Recently, Allis-Chalmers, Consolidated Systems and International Business Machines Corporation effected a nonexclusive mutual agreement relating to the production and marketing of automated control systems and processes.

For the typical system, Allis-Chalmers takes functional responsibility for the system using IBM data processing computer equipment, CSC specially engineered data conditioning equipment and instrumentation, and A-C basic and auxiliary industrial processing equipment. Now, Allis-Chalmers brings a balance of specialized judgments to bear on your problems . . . drawn on significant experience . . . to make major "contributions to the art" in many phases of *Systemation* and help you be sure before you invest.

Feasibility study shows opportunity

Your first step to Systemation *is a thorough feasibility study which spells out your opportunities for savings and puts a clear figure on the costs. Call or wire your nearest A-C office, or the Industrial Equipment Division, Allis-Chalmers, Milwaukee 1, Wis.*

Systemation is an Allis-Chalmers servicemark.

Systemation*

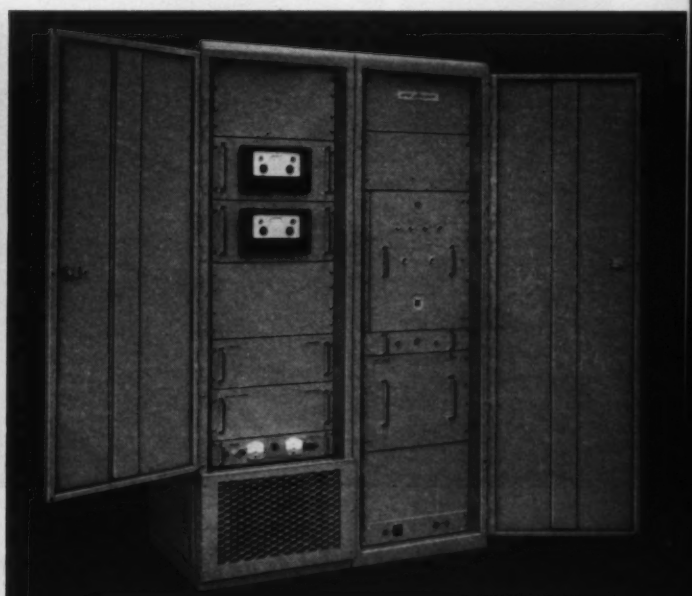
pays its way

ALLIS-CHALMERS

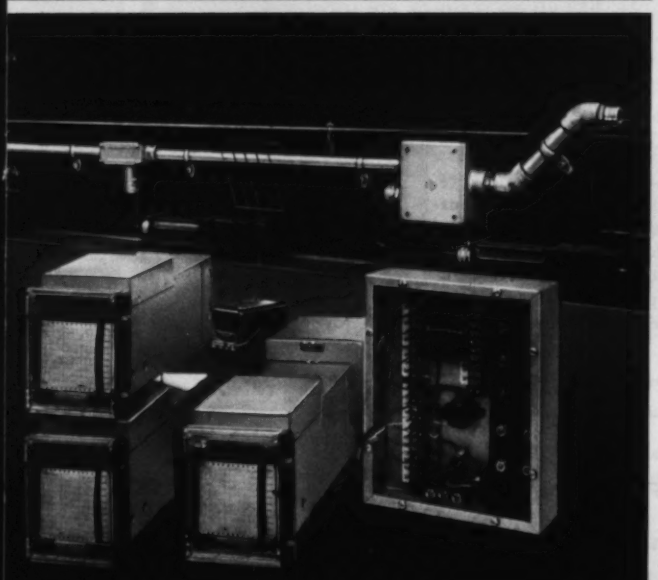
A-1531

Systemation of automation?

HIGH SPEED TEMPER MILL features include: automatic digital extensiometer to indicate strip extension (hardness pickup); automatic slowdown for rolling maximum length at rolling speed, yet prevent mandrel explosion or tail-end roll damage.



PRECISE AUTOMATIC GAUGE CONTROL for thin tin with automatic screw reset.



AUTOMATIC BED DEPTH CONTROL for traveling grate in GRATE-KILN iron ore pelletizing process.

CENTRALIZED CONTROL ROOM for generating plant using one computer to automatically control two units for start-up, operation and shutdown.

"Acco's New Hi-Pli Slings Handle like Hemp!"

THEY'RE SO PLIABLE THEY STRAIGHTEN OUT WHEN RELEASED

- ***They combine the pliability of hemp and the strength of steel***
- ***They will handle nearly any lifting job quickly and easily***
- ***They won't kink and will always hang straight when released***
- ***Completely free of crankiness, they're the kind of slings your men like to work with***

The amazing pliability of Hi-Pli slings comes from ACCO's arrangement of six ropes around one. They have patented Dualoc endings which double-lock the sling ends. They have a durable, clean Galacco finish which resists rust.

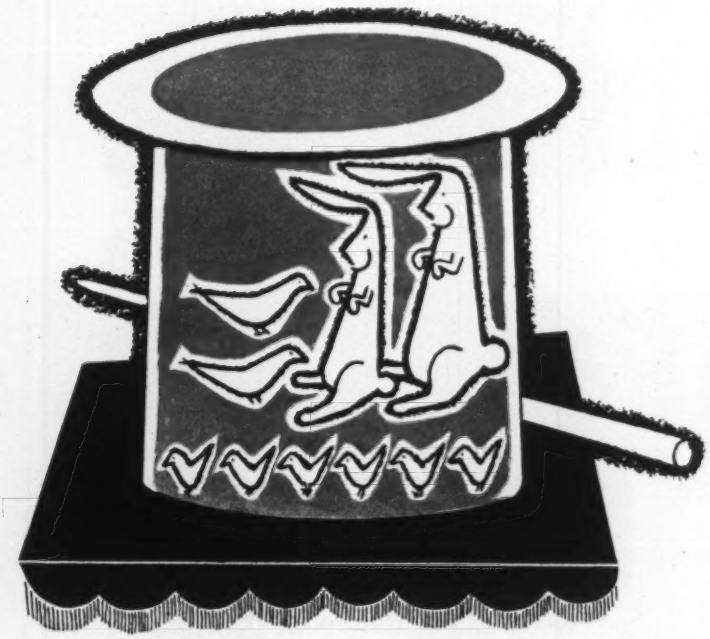
Hi-Pli slings, like all ACCO slings, are registered safe. This is your assurance that they have been factory proof-tested at twice load-carrying capacity before they are issued an ACCO tag and certificate of registration.

Ask your distributor about Hi-Pli slings now—or write us at Wilkes-Barre, Pa., for our new Bulletin **DH-532B** which lists the weights and strengths of the full Hi-Pli Sling line plus capacities (in pounds) of six of the most-used sling hitches.

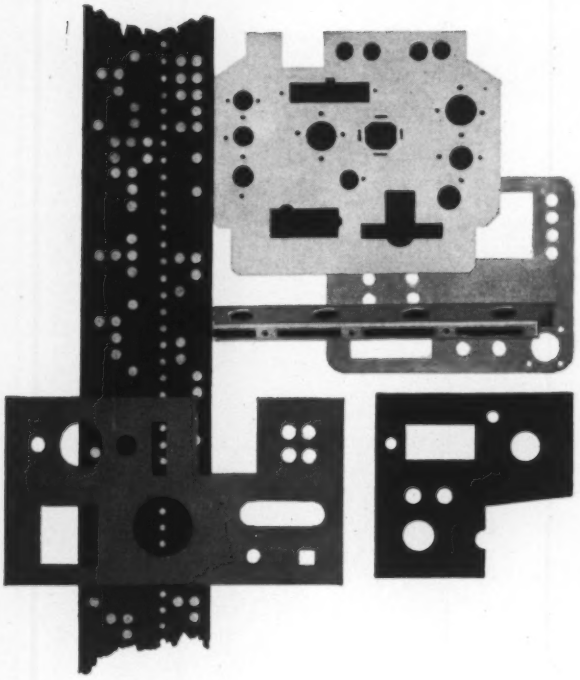
HI-PLI ACCO Registered® SLINGS

Wire Rope Sling Department • American Chain & Cable Company, Inc.

Wilkes-Barre, Pa., Atlanta, Chicago (Melrose Park), Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn. • *In Canada:* Dominion Chain Company, Ltd., Niagara Falls, Ont.



RELATED!



A spoken command, a wave of a wand. And—before your very eyes—a magician plucks from his hat rabbits, pigeons or chicks—one, two, or six of a kind. The *right equipment* is the key to his magic.

For metal fabricators, the WIEDEMANN is the *right equipment* to pierce plates and panels on a short run and medium production lot basis. A WIEDEMANN makes possible the production of 1-10-100-1000 or more parts—economically, accurately and efficiently—with a minimum of preparation.

Turrets carry all punches and dies ready for immediate use. Work is positioned mechanically to rapidly and accurately locate and pierce holes of many sizes and shapes. This combination eliminates layout, setup, handling, expensive tools and most costly factors which are necessary in other methods.

The new WIEDEMATIC is the latest and most efficient WIEDEMANN turret punch press. This machine is designed specifically for highspeed short and medium run production. Tool selection, work positioning and piercing are fully tape-controlled. Engineering changes, too, are readily made by simply substituting desired information on the tape.

In metal fabrication, a WIEDEMANN is your magician's hat. And—because of it—you realize substantial savings unheard of with other machines in the field. Write today for complete information on how a WIEDEMANN will make money for you. Include drawings for time study and recommendations for the *right equipment.*

From the versatile 150 ton R-15 down to the hand operated R-2, there's a Wiedemann for your short run piercing requirements.

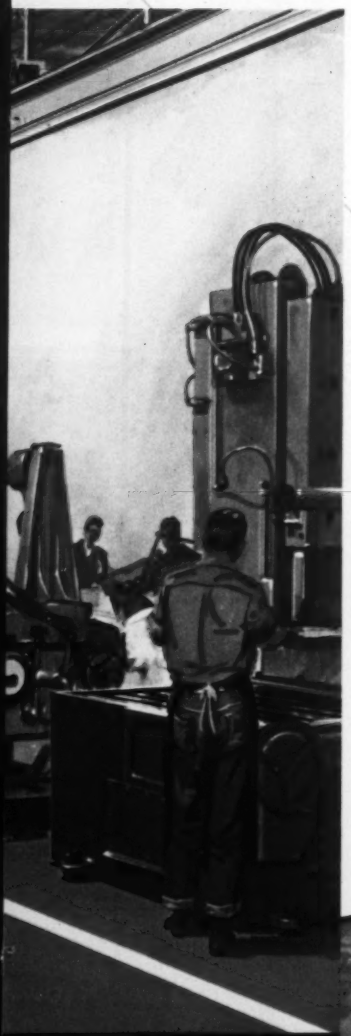
WIEDEMANN

WIEDEMANN MACHINE COMPANY
Dept. S-9, Gulph Road • King of Prussia, Pa.

RUST-OLEUM.

NEW COLOR

HORIZONS System



STOPS RUST AND PROVIDES LASTING BEAUTY

Gone are the days when color was used for the sake of color alone. Today, color is functional—helping to improve morale and increase efficiency—serving to color-code and mark safety areas, etc. The Rust-Oleum New Color Horizons System goes even further. It combines four important factors (1) the ability to stop rust, (2) smart, modern color harmony, (3) the durability to last and last, (4) ease of application that saves time, money, and metal. See how this system can bring lasting beauty to your plant, machinery, equipment, tanks, fences, etc. Your Rust-Oleum Industrial Distributor, with your Rust-Oleum Factory Specialist, will be happy to survey your plant and provide complete recommendations. Prompt delivery is assured from Industrial Distributor stocks in all principal cities of the U.S., Canada, and many countries around the world.

Faced with coating problems like these? Heat resistance, water resistance, chemical resistance, floors, galvanized metal, coatings that will dry in less than thirty minutes? Rust-Oleum, in its various systems, can be your answer. Call your Rust-Oleum Industrial Distributor, or write for the facts.

Apply Rust-Oleum 769 Damp-Proof Red Primer directly over sound, rusted surfaces to STOP RUST and cut maintenance costs

Just scrape and wirebrush to remove rust scale and loose rust—then brush Rust-Oleum 769 Damp-Proof Red Primer right over the remaining rust. Its **specially-processed** fish oil vehicle penetrates rust to bare metal as proved in radioactive tracing studies. You save time and money, as costly surface preparations are usually reduced.

RUST-OLEUM®

See our catalog in Sweet's.

STOPS RUST!®

Distinctive as your own fingerprint. There are imitations, but only **one** Rust-Oleum. Accept no substitute.

PROVED THROUGHOUT INDUSTRY FOR OVER THIRTY-FIVE YEARS

You take the brush! Try a free test sample!

ATTACH TO YOUR LETTERHEAD

RUST-OLEUM CORPORATION
2984 Oakton Street • Evanston, Illinois

At no cost or obligation, please send me:

- ☐ New full-color catalog on New Color Horizons System and specialized Rust-Oleum systems. Including color charts and applications.
- ☐ FREE TEST SAMPLE of Rust-Oleum 769 Damp-Proof Red Primer.
- ☐ Please have your representative contact us to discuss a plant survey.

Another NEW Jones & Lamson Optical Comparator
THE ECONOMY MODEL 14″-SCREEN PC-14A

This new 14″-screen universal measuring and comparison machine incorporates lateral, vertical and angle measuring facilities. It offers a combination of important features that set the standard for practicality, price, and performance:

1. All measurements read directly to .0001″ without computation.
2. High-intensity fan-cooled illuminating units for sharp definition of shadow image.
3. No adjustments when changing magnifications. A full range of *J & L Telecentric Projection Lenses* is available, from 5X to 125X.
4. Three table styles are available; a plain table as well as 18″ and 30″ ball or roll type measuring tables.
5. Work capacity — either 5″ or 8″ in diameter with max. of 24″ between centers.

Many other features such as new normal light reflection unit, tracing attachments and super-high-pressure mercury arc illumination, are available.

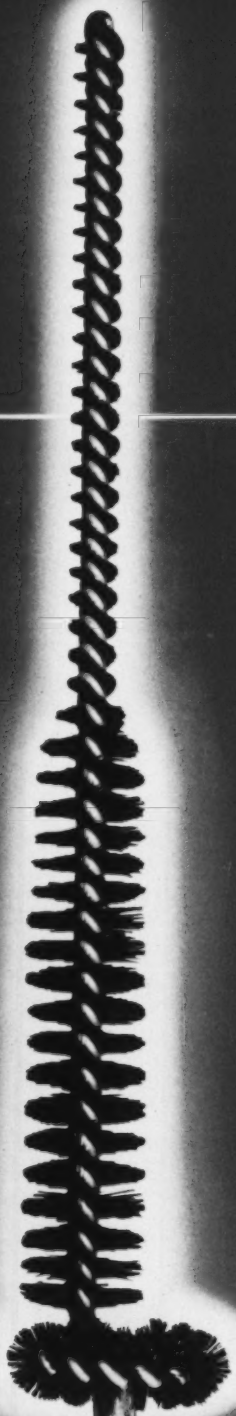
See this machine in action at Booth #308, ASTME Show, Los Angeles. Or call one of our West Coast representatives: Germain Machinery, Los Angeles and Phoenix; Moore Machinery, Berkeley; Perine Machinery & Supply, Seattle; Allied Northwest Machine Tool Corp., Portland and Salt Lake City.

JONES & LAMSON

COMPARATOR DIVISION

Jones & Lamson Machine Company, 517 Clinton Street, Springfield, Vt., U. S. A.

Keystone Wire solves dairy brush forming and corrosion problems



Uniform wire softness is needed to perform brush twisting operations on high-speed twisting machines. To solve this problem, Keystone Steel & Wire Company developed for Regal Manufacturing Company, Fond du Lac, Wisc., a dead soft galvanized twisted Brush Handle Quality Wire. A special tight zinc coating is designed to adhere firmly during the severe twisting.

Regal Manufacturing Company specializes in making unusual brushes for the dairy and creamery industry—for example, the milking machine brush illustrated at left.

For filled brushes, galvanized stapling wire anchors crimped white nylon bristles into brush blocks of Super Hi-Impact plastic, hard rubber and hard wood. Regal uses Keystone's galvanized Stapling Quality Wire to resist corrosion from water and lactic acid.

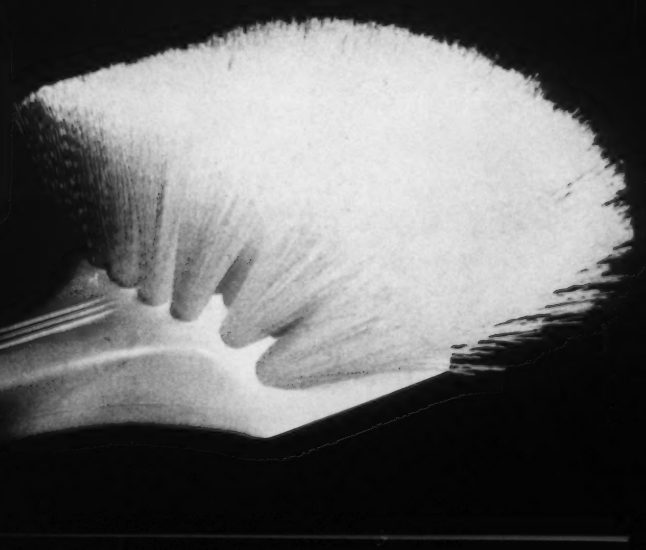
These quality wires are products of Keystone's Metallurgical Laboratories. If you make brushes or other wire formed products and want to improve them, tell us about your wire needs. We shall analyze your requirements and make the necessary recommendations.

Keystone Steel & Wire Company, Peoria, Illinois

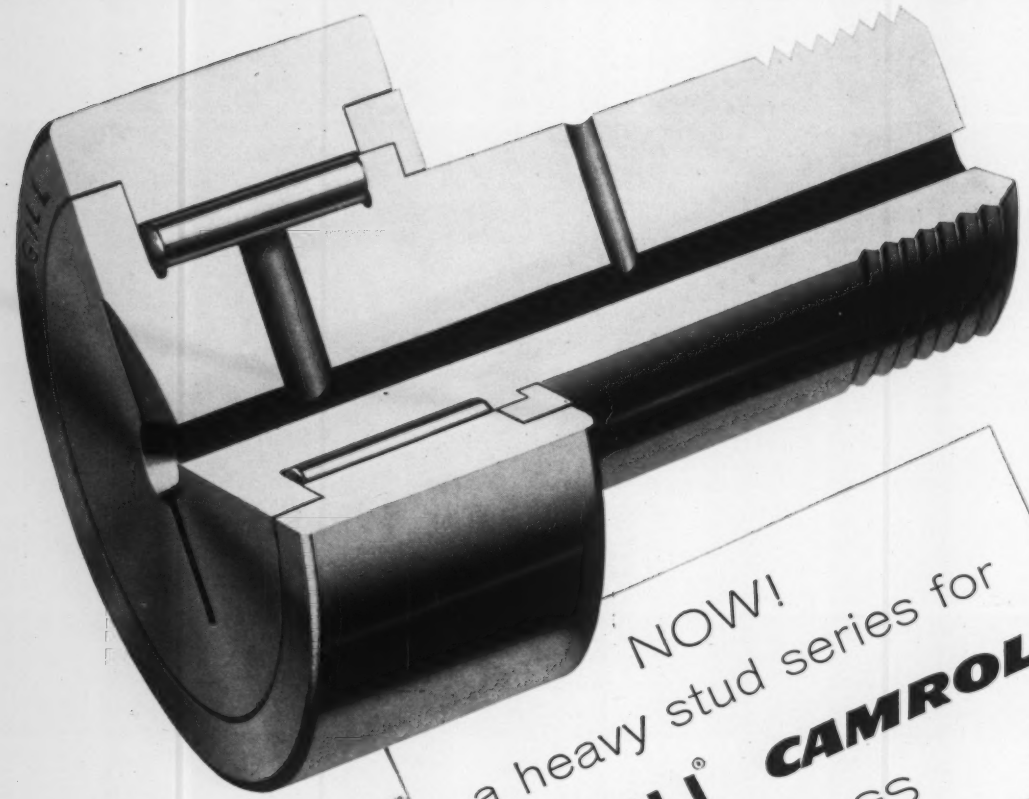
KEYSTONE

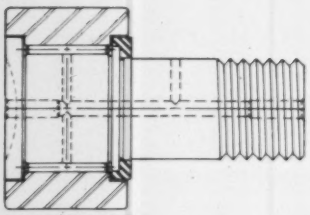
WIRE FOR INDUSTRY

MADE AT PEORIA, ILLINOIS, U.S.A.

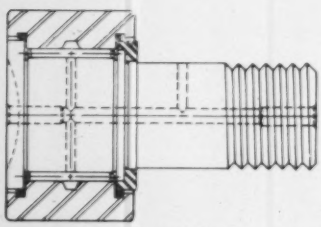


REGAL BRUSHES





CFH SERIES



SCFH SERIES WITH INTEGRAL SEALS

with integral seals in a wide range of sizes

These CFH and sealed SCFH series units provide a heavy stud for otherwise dimensionally standard CAMROL bearings. These new McGill cam followers offer increased diameter studs that provide greater shear strength to accommodate excessive stud deflection in critically loaded track, guide, support and cam follower applications.

SCFH series heavy stud CAMROL bearings with integral seals for lubricant retention and protection against contamination are dimensionally interchangeable with the unsealed CFH series.

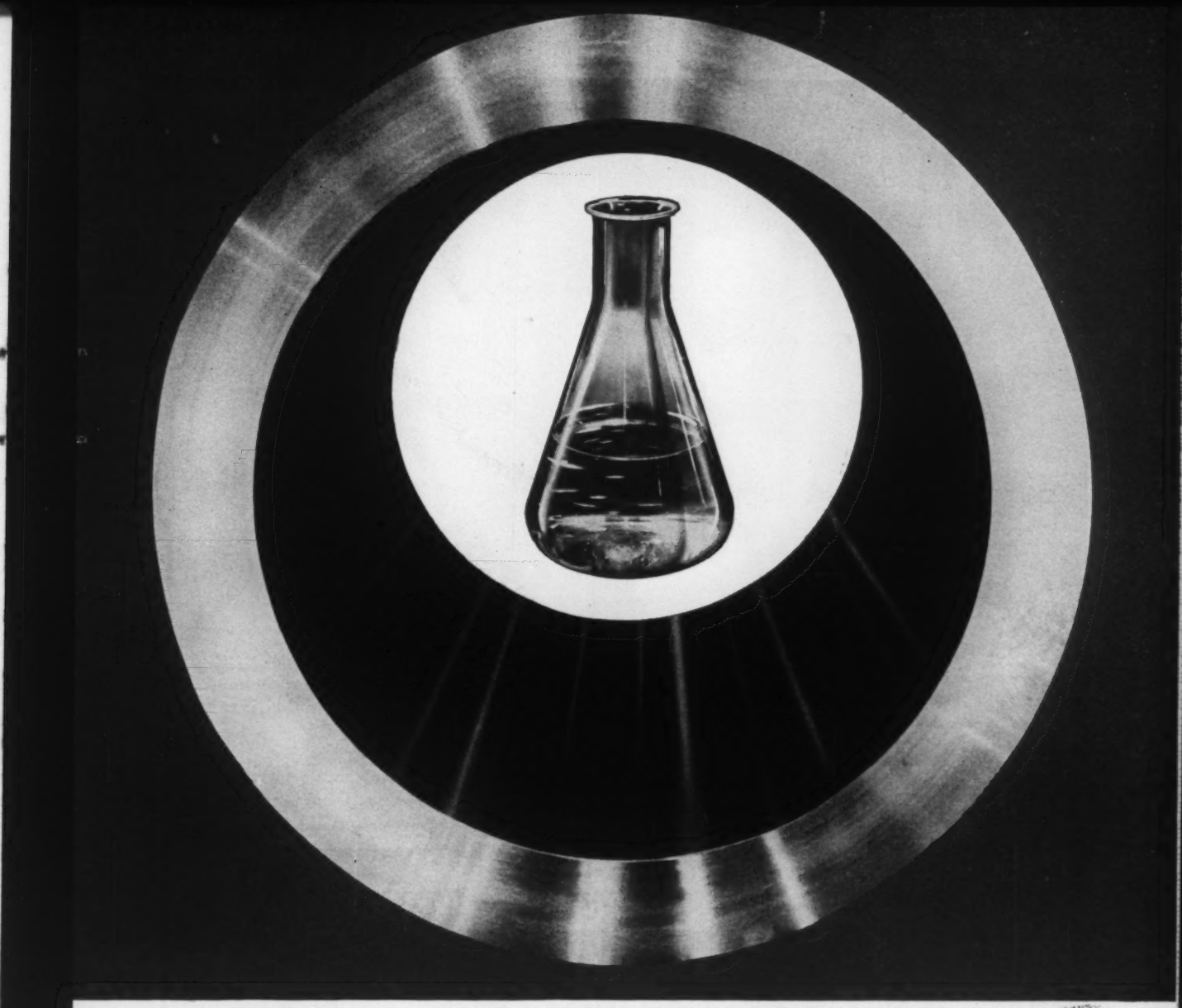
Both series available from stock in roller diameters from ½" through 4"; larger sizes available on special order in production quantities.

For information and data on the complete line of McGill heavy duty needle roller bearings send for Catalog No. 62.

CONSULT McGILL EARLY
IN YOUR PRODUCT R and D
specialized engineering saves time, improves design

McGILL MANUFACTURING CO., INC.
Bearing Division
301 N. Lafayette St., Valparaiso, Ind.

engineered electrical products
McGILL®
precision needle roller bearings



FORMULA FOR FLEXIBLE ANALYSES

LOOKING FOR A SPECIAL COMPOSITION in your steel tubing... perhaps in limited quantities? Then ACIPCO is the ideal source! Here are complete facilities plus the newest process*... ACIPCO CERAM-SPUN®... for producing centrifugally spun tubes to meet the most rigid specifications.

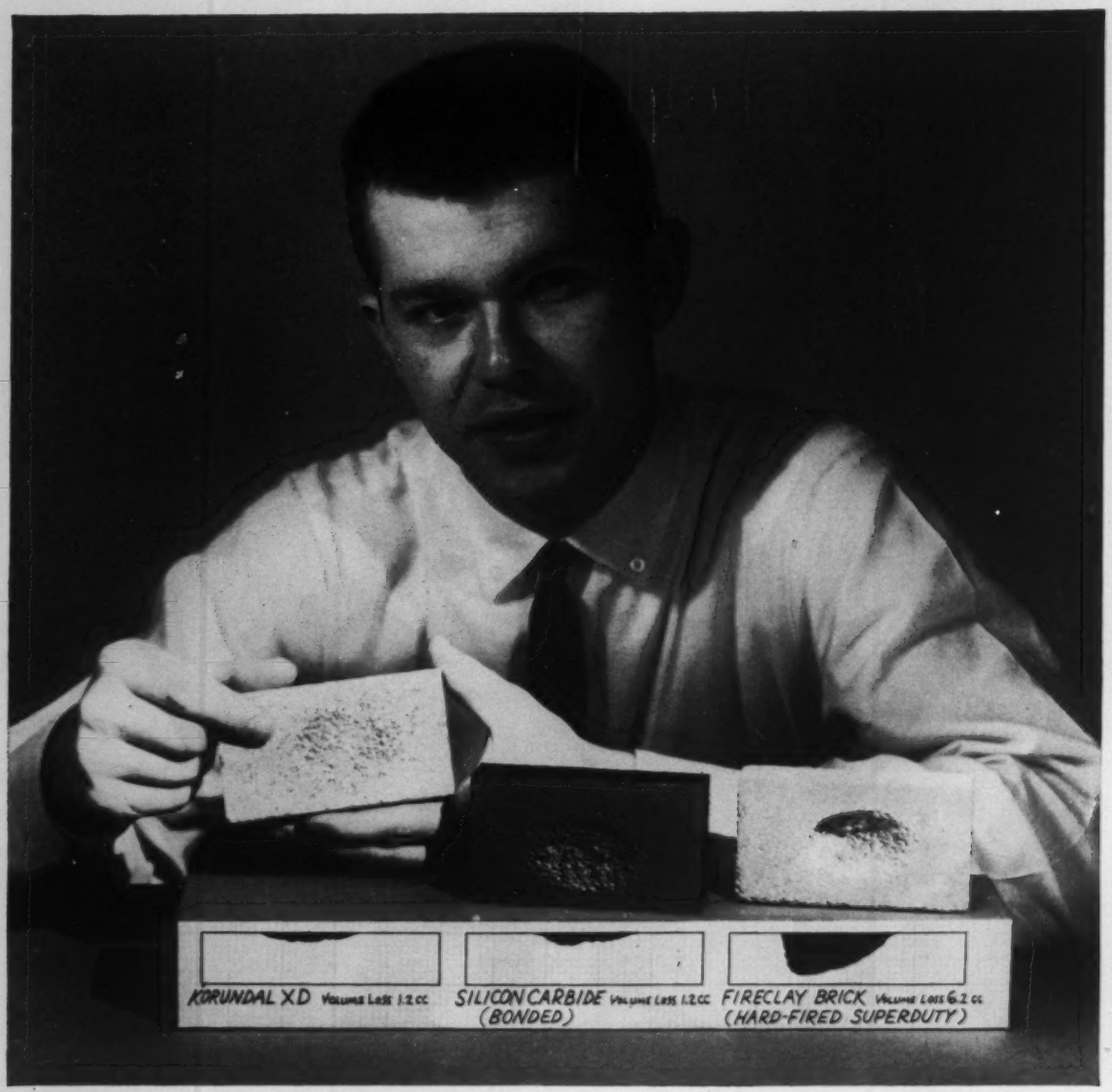
CONSIDER THESE ADVANTAGES: 1. Electric furnaces, both arc and induction type, are available in a variety of capacities... heats can be sized to produce the exact footage required. **2.** With minor modifications for castability, all carbon and low alloy steels can be furnished in compliance with the chemical composition limits of SAE and AISI Standards. Special ferritic chromium-molybdenum alloy steel tubes are manufactured to meet the requirements of ASTM Specification A426-58T. **3.** All ACI corrosion resistant and heat resistant alloys... as well as Cast Monel and ARMCO 17-4 PH.. are available. **4.** Also, gray and alloy cast iron and all grades of AMERICAN DUCTILE IRON® (including the austenitic grades) are regularly cast as pipe, tubes, fittings and specials in all sizes and thicknesses.

IN ADDITION, ACIPCO offers a wide range of sizes, with O.D.'s from 2.25" to 50". Wall thicknesses vary from .25" to 8"; as-cast lengths from 4 feet to 20 feet; longer lengths can be made by welding.

If you design, manufacture or use parts requiring tubular metal components, it will pay you to investigate the other advantages ACIPCO offers. For complete facts, contact ACIPCO STEEL PRODUCTS, Division of American Cast Iron Pipe Company, Birmingham 2, Alabama.

*Patent applied for

ACIPCO CERAM-SPUN®
STEEL TUBING


KORUNDAL XD Volume Loss 1.2 cc
SILICON CARBIDE (BONDED) Volume Loss 1.2 cc
FIRECLAY BRICK (HARD-FIRED SUPERDUTY) Volume Loss 6.2 cc

Shaded areas show comparative material loss—resulting from identical blasting with silicon carbide grit in standard test.

Korundal XD—developed by Harbison-Walker—shows exceptional abrasion resistance

KORUNDAL XD refractory shows the same abrasion resistance as bonded silicon carbide. *And it costs less.* It's nearly five times as abrasion-resistant as hard-fired superduty fireclay brick, and has excellent resistance to oxidation.

The hardness of this new high-alumina refractory—plus other phenomenal physical properties—suggests its economical use in lining reheating furnace bottoms, blast furnaces, coke chutes, sinter line ducts, hot metal cars, open hearth mixers, soaking pits and for many other specialized applications. Write for complete technical information.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
General Offices: Pittsburgh 22, Penna.

World's Most Complete Refractories Service

HW 61-13

Who Decides Prices?

We have just waded through many pages of the *Congressional Record* in which a group of Democratic senators, headed by Mr. Gore of Tennessee, argues against a steel price increase. We are sorry we cannot recommend it for logic or statesmanship.

Few people like higher prices. The producers, facing intense competition from other materials and foreign steel, would like to avoid them. They have already absorbed wage increases totaling 30 cents an hour. In fact, prices on 10 of the 43 products included in the Bureau of Labor Statistics' price index have been reduced this year.

Steel users, caught in their own profit squeeze, certainly dislike the prospect of having their material costs raised.

The issue is simply whether the industry can avoid price adjustments in the face of rising wage costs.

But Senator Gore favors the bully boy approach. He advocates:

1. **The President should use his office for moral suasion.**

The President did. We suggest it comes with poor grace that a President whose spending threatens to set off new inflation should attempt to throw the blame on industry.

2. **The Federal Trade Commission should prosecute the steel industry.**

That possibility isn't easily dismissed. Whether or not the government could prove a case, it could harass the industry with drawn out, expensive legal proceedings.

3. **The big companies should be broken into bits.**

Steel is inherently a big industry. It must be big to marshal the necessary raw materials and to provide the facilities needed to produce steel in volume efficiently.

4. **Steel should be subject to utility type regulation.**

Utilities generally have a geographic monopoly. They have a fairly predictable volume. Even Senator Gore admits few people would want to impose railroad-type regulation on steel.

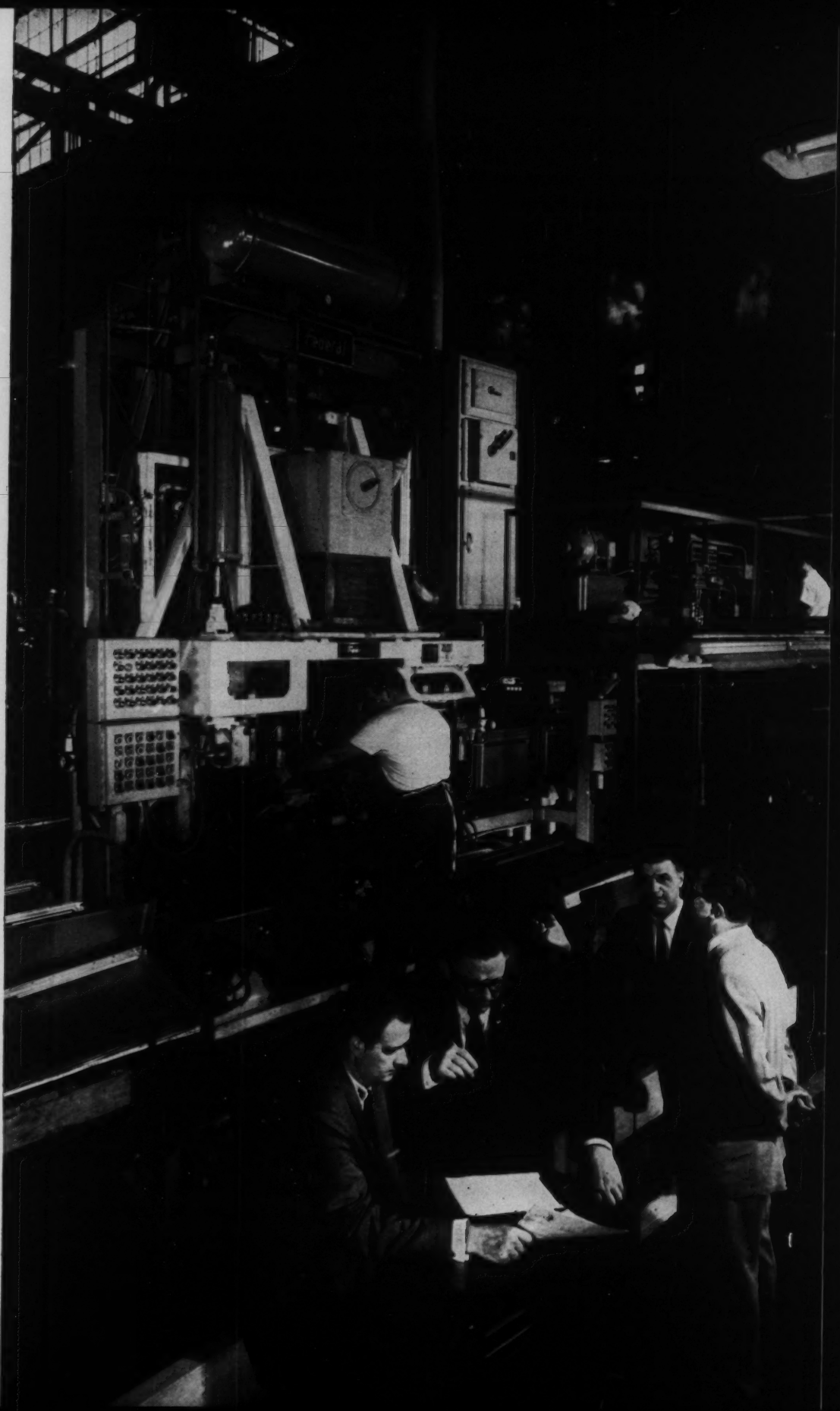
In most of the steel labor negotiations since the end of World War II, we have had government intervention. As a result, steel wages, which are as pattern setting as steel prices, were raised far more than they would have been had the government remained aloof. We recall that such wage increases were invariably called noninflationary by administration spokesmen. Now we are exposed to a different type of political logic.

We know of no responsible people in industry who want more inflation. Industry has been consistent in its opposition to higher costs and prices.

In a free economy, the price of steel—or rivets, automobiles, machine tools, or calico—is a matter that should be decided in the market place and not on the Senate floor.

Walter J. Campbell

EDITOR



Federal Welding Line at Whirlpool's Evansville, Indiana, refrigerator plant automatically forms and welds together complete food liner shells at a rate of 200 per hour. Here, F. A. Bodenheim, Jr., manager of welder sales for McKay's Federal-Warco Division, goes over latest production charts with H. J. Muehlbauer, director of manufacturing engineering for Whirlpool, as Robert Bussell, sales representative for Federal-Warco, discusses operations with Gene Rommel, general superintendent of tooling for Whirlpool.

Photo by ARNOLD NEWMAN

A completely integrated plant . . . a single source of supply . . . one area of responsibility! A new idea? Not really, but an idea that's not easy to bring to reality. McKay Machine has done it for metal fabricators, designing and building equipment to volume produce parts or entire units from raw steel to finished product. ***This is McKay Machine*** We know steel handling . . . we've been designing uncoilers and coil-handling equipment for 30 years. McKay Machine knows welding because the highly respected names of Federal Welder and Berkeley-Davis are now a part of our company. We know processing and forming . . . McKay levelers, tube mills, and cold roll forming machines have been specified by leading industrial firms for more than two decades. And McKay Machine knows stamping, as the Warco Press name testifies. McKay builds the industry's most popular shearing and slitting equipment. Only McKay Machine designs and builds all the components for a truly integrated production line. If you are one of the hundreds of manufacturers who must shave production and handling costs to successfully compete, McKay Machine should interest you. If we do, let us know and we'll meet with you at your convenience. *The McKay Machine Company, Youngstown 1, Ohio.*

McKAY MACHINE

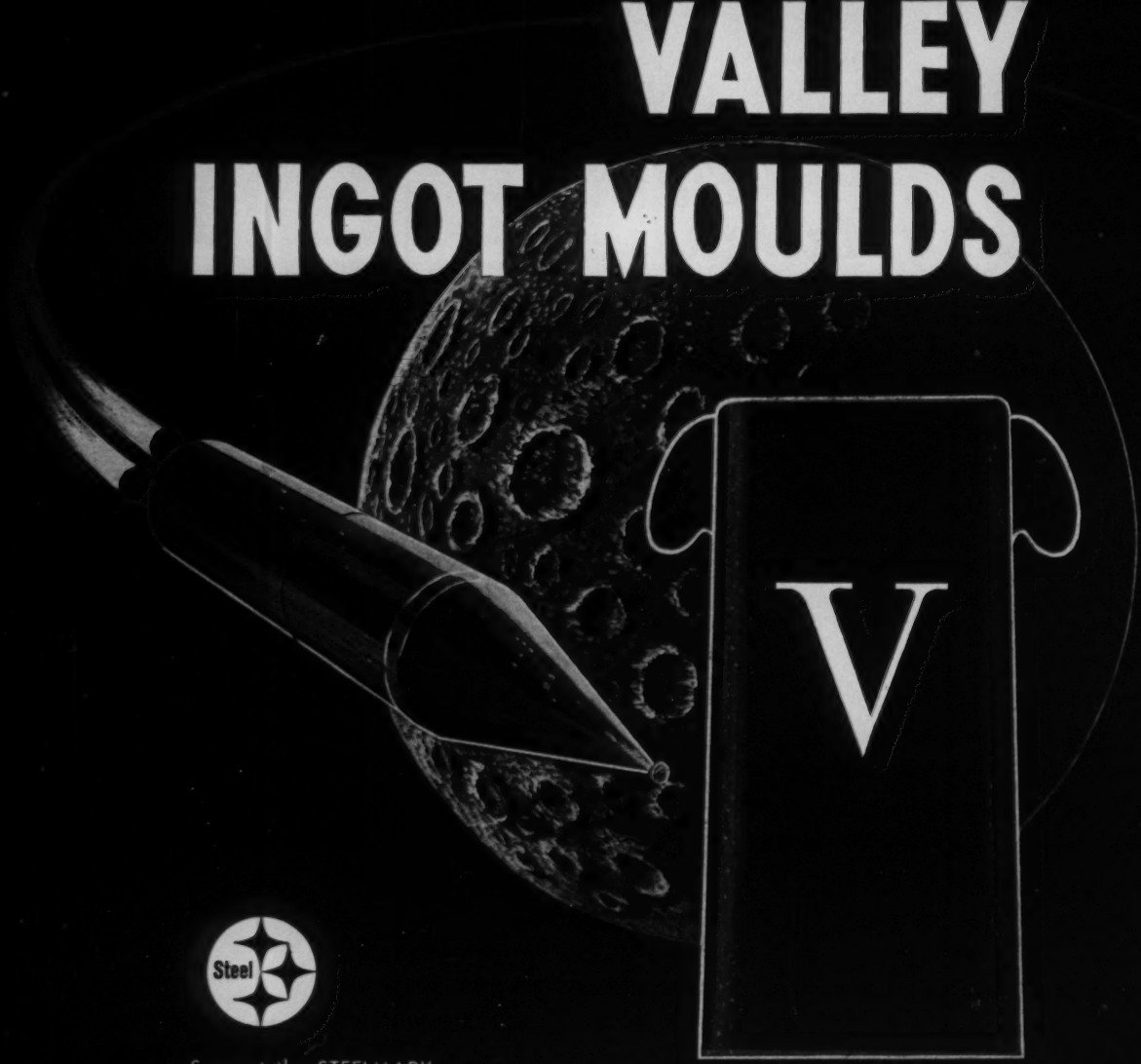
McKay Tube Mills and roll forming machines are considered among the best engineered in the world.

Warco Presses can be found in the leading automotive, appliance and aircraft plants . . . wherever stamping is a major operation.

Berkeley-Davis Fusion Welding Lines, such as the huge installation above, are used by an ever-increasing number of leading steel fabricators.

For over 75 years steel has been poured into Valley Moulds, and now the new metals... used in space . . . . will also be poured into

VALLEY INGOT MOULDS

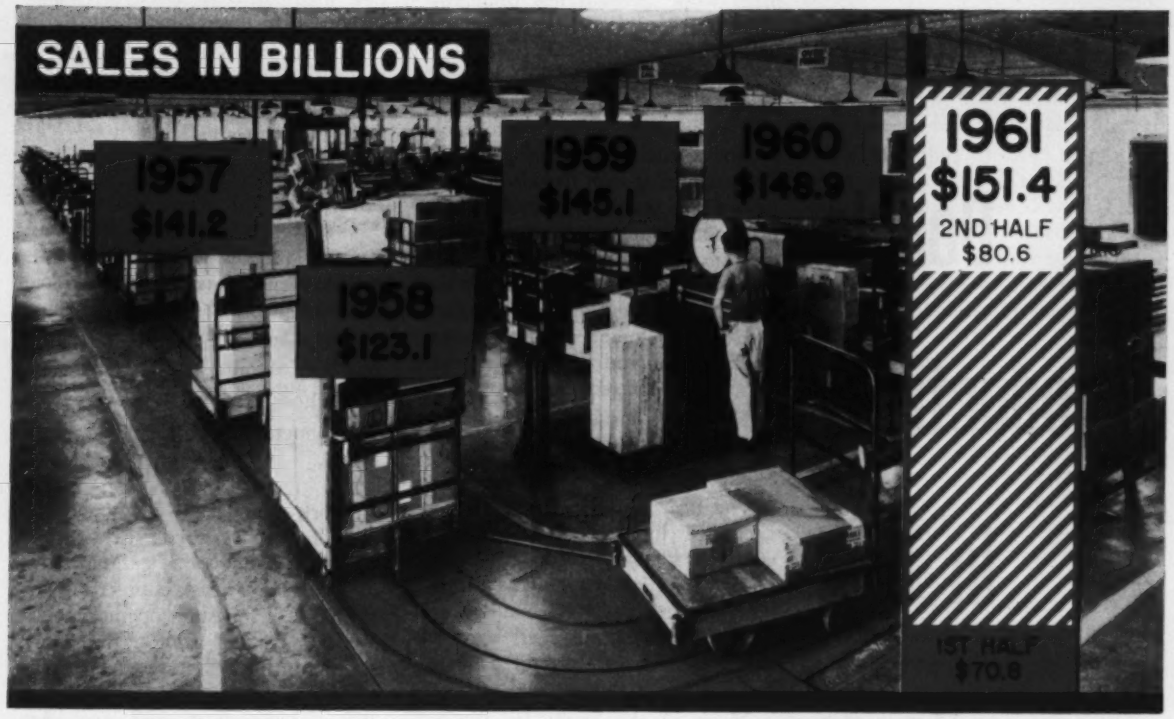


Steel

Support the STEELMARK

VALLEY MOULD AND IRON CORPORATION

GENERAL OFFICES: Hubbard, Ohio
WESTERN OFFICE: Chicago, Illinois
NORTHERN OFFICE: Cleveland, Ohio



*Includes SIC 33-Primary Metal Products; 34-Fabricated Metal Products; 35-Machinery (except electrical); 36-Electrical Machinery; 37-Transportation Equipment; 38-Instruments & Related Products.
Source: Department of Commerce. Second half estimated by STEEL.

Metalworking Heads for Best Year

SALES of the metalworking industry this year should top the record by at least 1.7 per cent despite two handicaps: The recession bottomed out in the first quarter, and the recovery in metalworking generally still lags the over-all pace.

Unless there is a major auto strike (which is highly unlikely—see Page 58), the strength of the recovery in the second half should more than make up for the weak first half, reversing the pattern of 1960, the record year.

• **Methodology**—From January to June, output of the five main metalworking groups—primary metals, fabricated metal products, machinery (including electrical), transportation, and instruments—gained 12.3 per cent (using seasonally adjusted data). If that rate is no more than matched in the second half, annual sales will reach $151.4 billion. And there are many reasons to believe the pace can be maintained—perhaps even stepped up a little.

• First, orders for metalworking equipment increased at a slightly faster pace in the first half (14.6 per cent) than sales did. That means backlogs swelled slightly, giving the industry a slight cushion if it's needed. But don't look for any sizable buildup of unfilled orders. Industry has sufficient capacity to turn orders into sales rapidly.

• Second, it is expected that accelerated spending for defense will begin to show up later this year.

• Third, auto production—barring a strike—is expected to be at the highest fourth quarter rate in several years.

• Fourth, steel production is still climbing, and by the end of the year, it could be at a record rate.

• Fifth, machinery manufacturers, the largest segment of metalworking, show no signs of weakening. In fact, this group hardly had a recession—first half sales were only 0.8 per cent under the year ago figure.

• Finally, both government and private economists are predicting that the recovery will continue at its present rate at the least (see Business Trend, Page 75).

• **Alternatives** — In predicting the full year's sales on the basis of first half data, it is possible to come up with a spread of $142.8 billion to $158.4 billion. If you assume that the second half will merely equal the first (seasonally adjusted), you get the lower figure. If you use the unadjusted data, which showed a 23.9 per cent increase during the first half, and assume a similar increase in the second, you get the top figure. Neither seems likely.

How to Double Productivity In Two Years

HOW WOULD YOU like to double the productivity of your plant work force in less than two years? Erie Enameling Co., Erie, Pa., did.

In the process, the firm lowered its breakeven point by 20 per cent and converted some unprofitable products into paying propositions. The enameling firm has also slashed its average inventory level by 25 per cent, improved average inventory turnover from around 75 days to less than 55 days, stepped up deliveries, and developed proprietary products. Closer co-operation between union and management has also been achieved.

The key: Just plain good management—no heavy investments, no gimmicks.

The firm had been struggling to keep red figures off its financial statements; now it's in a good competitive position. Comments a company officer: "Had we made all of these changes three years ago, we could have driven several competitors out of business."

Much of the credit for the rejuvenation belongs to Herbert R. Spencer Jr., the firm's youthful president. He insisted that some of the new procedures could be instituted after others had argued that they couldn't. Mr. Spencer hired E. A. Cyrol & Co., Chicago management consulting firm, to assist. Several managers who disagreed with the new methods were asked to resign. Others were given new duties.

Among the changes that have made the improvement possible:

- Work standards and incentives have been installed.
- Production scheduling has been revamped.
- Plant layout has been improved to permit better material flow.
- Modern purchasing methods have been adopted.
- Unnecessary financial reporting has been eliminated.
- Methods have been improved.
- Foremen have been made managers.

• Work Standards—Many people, including some former Erie executives, considered work standards impossible, or at least impractical, for the kind of job shop operation performed by the firm. But work standards have been predetermined economically for each job that goes through the shop—and most are one-shot items. The work standards, and accompanying incentives, are credited in large part for the firm's new profitability.

When standards were introduced in mid-1958, the average efficiency in the plant was below 55 per cent

E. A. Cyrol (left) shows the company's uptrend in output per manhour to President Herbert R. Spencer Jr.

of the standard. It has risen to 105 per cent.

Even more surprising, girls who have had no industrial engineering experience, or special training of any kind before joining the company, compute the production standards from standard data tables. It's a species of standard data developed by the company for work that does not repeat from order to order—it's "customwork with a vengeance!" Production standards are built up from elemental time values and applied through code numbers. The standards are established for each job as required and are recorded on the job shop order —to be used once and never more. Conventional shop routings, showing sequence of operations, are of no value here—and are not used—because each job is different.

Resistance to the establishment of work standards by some workers led to a 127 day strike. Part of the problem was inadequate communications, says Guido Mancini, president of United Steelworkers Local 1680, which has the plant organized. "Many of the men felt this would be nothing more than a piecework system and objected to the use of standards," he reports. "When management wants to install standards we can either buy the system or oppose it," he says. "We've bought this program. As long as there is fairness on the part of the industrial engineering department and on the part of the men in the shop, standards are good," he asserts. He says the great majority of the men are well satisfied, but "there are some bad apples in every barrel."

• **Production Scheduling** — As in many job shops, production scheduling had been done by the seat of the foreman's pants. There was no set procedure. Now a schedule of operations is set up for each piece of work. The foreman can spend his time planning and consulting, rather than putting out fires. Also, the work, not the foreman, now pushes the worker.

Before the new production scheduling system was established, the plant floor—including aisles—was covered by material in process. The firm had designed special storage racks to handle it. Under the new system, material flow was so vastly improved that it was not necessary to build racks.

And machines can now be scheduled three and four days ahead, so there is much less downtime. In fact, downtime—or time available but not used—averaged 40 per cent before the new system was installed. Unutilized time now averages less than 15 per cent.

Says Mr. Cyrol: "One of the big things that management in many plants must overcome is the feeling that this kind of custom, job shop work cannot be planned. When you're paying today's labor rates, you sure as hell better plan it."

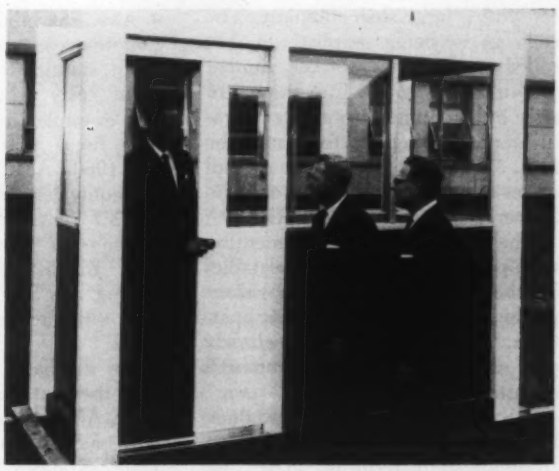
He says that the key to productivity is "giving the worker a road map and letting him drive." That's what the production scheduling system, coupled with incentives, does. Says Mr. Cyrol: "The faster you want to go, the better the road map must be."

• **Methods Improvement**—In conjunction with setting standards, work methods have been improved. Many of the moves were simple, but they brought big savings. Example: Welders had been picking up formed pieces, placing them on tables, welding them, then restacking them. Now the workpieces are stacked initially in such a manner that the welding can be done on the skid—no handling.

Another example: The purchase of bed rails for a press has reduced setup time enough to bring annual savings of $2000 at the firm's current production level.

• **Smart Purchasing**—The purchasing function has been placed under

These girls, and two others, determine work standards. The system has been so designed that standards can be set by people with no industrial engineering experience



Clayton Merrill demonstrates the firm's first proprietary product, which he designed, for Norman J. Haskins (center), manager-Architectural Div., and R. W. Brownfield, marketing manager

the firm's controller, Rollin Jewell. Large savings have been made by "listening to every supplier who calls on us, making as many inquiries on my own as I can, and by patient attention to detail," says Mr. Jewell.

Examples: 1. He has changed sizes of purchased steel to minimize scrap. 2. He has changed suppliers and is obtaining oxygen and acetylene for 15 per cent less than he did previously. 3. He has scheduled incoming steel shipments in such a way as to minimize total costs—purchasing costs and ownership costs. 4. Much unnecessary financial reporting has been eliminated.

• **New Products**—To minimize the "to-ing" and "fro-ing" of its order level, the firm is developing proprietary products. First on the market will be the porcelain enameled steel building shown in photo on Page 57. Designed on a building block concept, it comes in a variety of sizes. The firm visualizes uses ranging from popcorn stands to border patrol stations. The first marketing emphasis will be on its use as a guardhouse at plant entrances. Other possibilities: Toll booths, scalehouses, in-plant offices, locksmith shops, tool sheds (it comes without windows), ticket booths, and emergency shelters.

In the development stage is a one coat, porcelain enameled guard rail. Erie is working on this project with a large steel company. The coating is being applied to hot rolled steel. The "correct number of Btu" is being put into the guard rails by dropping furnace temperature and slowing the feed, says the firm. It expects the new guard rail to get a market penetration of 10 to 20 per cent "with little difficulty."

The firm is also experimenting with porcelain enameled steel tables for the luxury market. It envisions producing intricate, aesthetic patterns; some prototypes are already part of the decor in the company's executive offices.

A possible, long range, product: Porcelain enameled panels for electroluminescent lighting. The firm is also investigating a porcelain enameled muffler as a new product. And some thought is being given to enameled, expanded metal items for decorative uses.

What AMC Won in Little Publicized Concessions

DID American Motors Corp. give too much in settling with the United Auto Workers?

The Big Three may have thought so as it struggled with the UAW to reach terms. Yet the fourth largest automaker won several, little publicized concessions.

The union agreed to reduce the time paid for but not worked from 44 minutes per 8-hour shift to 39 (still above the Big Three average of 24 minutes). Plant-wide seniority was virtually eliminated for new provisions to make better use of manpower. The 1 cent, cost-of-living (C-O-L) adjustment due Sept. 1 was given up. The UAW agreed that production standards could be set in a new way. An unchangeable management rights clause was granted.

What's more, the union gave in to a limitation on the annual improvement factor: If AMC's profits are insufficient to pay fringe benefits, the difference will come out of the yearly increase of 6 cents, or 2.5 per cent.

• **AMC Stability**—The terms also give the company greater aftertax profit stability by varying employment costs according to earnings. For example, in the highly profitable fiscal year that ended Sept. 30, 1960, AMC would have paid the equivalent in stock and benefits of 23.7 cents per worker per hour if the new plan had been in effect. But in the less profitable year ending this Sept. 30, it would have paid out the equivalent of only 9.6 cents.

On the basis of profit projections over the next three years of the contract, AMC will pay out the equivalent of 34 cents under its plan. Its labor expenses have been running 3 to 5 cents under GM-Ford-Chrysler levels.

• **Progress Sharing** — American's program provides that 5 per cent of gross profits (after provision for stockholders) will go in AMC stock held for each worker, with voting rights controlled for a time by the company. Another 10 per cent goes into a "progress sharing" fund to pay all pension and insurance benefits. If the present SUB funding plan sinks below the maximum position, progress dollars make up the difference. Any balance left in the progress fund could be split among the workers, but it will probably go in a contingency fund.

The progress sharing fund will be started with a $3 million surplus held in the AMC-UAW insurance pool. No profits go into the fund until the end of the next fiscal year, Sept. 30, 1962.

• **Other AMC Terms**—The company raised pension benefits from $2.40-$2.50 per month to a flat $2.80 for past and future service. On supplemental pay for company scheduled short workweeks, AMC will pay 65 per cent of the difference between hours worked and 40 hours. The regular SUB rates are raised to 62 per cent of gross pay instead of 65 per cent of net. That equals about 75 per cent of take-home pay. In addition, maximum weekly benefits are raised from $30 to $40, and duration of payments is extended to a full year.

The firm boosted medical-hospital insurance, and the full cost now will be paid out of profits. It increased sickness and accident benefits from $45 to $100 weekly. The company also boosted life insurance maximums from $5000 to $9000. It has continued the quarterly adjusted C-O-L allowances and factored 12 of the 17 cents now paid as C-O-L into base wage rates. AMC also increased jury duty pay and transfer allowances. Transfers should cost little because the company has automotive plants at only two locations—Milwaukee and Kenosha, Wis.

New Army Offers New Markets

TWO YEARS AGO, the scoffers ridiculed talk of any Army modernization program which would mean an additional $1 billion a year for hardware.

Today, the Kennedy administration has started a program leading to at least an additional $1 billion annually for Army research and procurement. A good bet: It will build up in the future to a hardware budget of $5 billion or $6 billion a year.

Although a large number of metalworking firms are already well established in the business, the Army's icecap-to-jungle needs demand the talents of many more.

The new Army offers new opportunities to metalworking.

You can see why in this example of a typical operation in the modern service:

Several Chinook helicopters (built by Vertol) land a Pershing missile (Martin is the prime contractor) which can be fired from a mobile transporter - erector - launcher (produced by Thompson Ramo Wooldridge). The Pershing "sees" its target through the eyes of drones (from Northrop) patroling the battlefield.

And here are examples of other opportunities in which big and little contractors will be able to participate:

The Army wants another source for M-113 personnel carriers. Those built by FMC Corp. have become Army standards.

More than a dozen different steels reportedly go into the M-14 rifle. Mass production has been started.

If you yearn to tackle the really difficult job, give the Army a much needed noiseless vehicle.

Military Appropriations Are Given Boost

	(Millions—Fiscal years) 1960	1961	1962
Research, Development, Test & Evaluation			
Military Sciences	$149.9	$173.4	$194.6
Aircraft	22.6	35.1	45.9
Missiles	474.5	546.3	464.7
Astronautics	—	40.0	72.0
Ships	1.1	0.6	0.7
Ordnance & Vehicles	108.7	85.5	103.4
Other	213.3	185.0	221.4
Management	102.1	100.3	102.7
Totals, RDT&E	1,072.2	1,166.2	1,205.4
Procurement			
Equipment	698.9	865.8	1,458.0
Ammunition & Missiles	628.6	698.8	1,025.0
Other	60.1	69.2	81.0
Totals, Procurement	**1,387.6**	**1,633.8**	**2,564.0**
Totals, RDT&E and Procurement	**$2,459.8**	**$2,800.0**	**$3,769.4**

• **More Spending**—Under President Kennedy, the modern Army is becoming a highly mobile, nonnuclear force. Hence the 35 per cent increase in research and hardware appropriations from fiscal 1961 to fiscal 1962 (see checklist). President Kennedy has ordered hundreds of millions of dollars spent on such conventional warfare hardware as: Trucks and trailers, armored personnel carriers, tank recovery vehicles, tanks, rifles, ammunition, and hundreds of electronic items to maintain the modern Army's communications systems.

The budget for procurement of hardware in fiscal 1962 is $2.6 billion and includes such major expenditures as $585 million for missiles, $440 million for ammunition, $398 million for combat vehicles, $343 million for tactical vehicles, $296 million for electronic and communications equipment, $248 million for aircraft, and $81 million for weapons.

• **Better Weapons to Come** — Tomorrow's procurement programs are being developed today in Lt. Gen. Arthur G. Trudeau's research and development complex, which includes 400 projects. Those research projects are in turn broken down into 2500 separate tasks involving the work of the seven Army technical services, 52 installations, 550 universities, nonprofit institutions, and prime contractors, and 40,000 civil and Army personnel.

The general sums up industry's

'Imagineering'

Is the Key to Army Research

"National security depends, as never before, upon the imagination and boldness with which we acquire and utilize new scientific discoveries and industrial techniques. We must outstrip the foe in the crucial field of 'imagineering.'"

—Lt. Gen. Arthur G. Trudeau, Chief, Army Research & Development

role in the new Army: "The contributions of American industry are tremendous—and indispensable." In 1960, the general's office exchanged briefings with 17 firms that have "outstanding" research capabilities. An unclassified booklet, *Contractors Guide*, is available to all who wish to know more of the Army's research efforts, and how they can fit into the Army-industry "partnership." In addition, an 8 volume problems guide lists more than 1000 areas of interest. It's available to firms cleared to receive it.

• **Mobility Requirements**—To put out small war fires before they flame into major conflagrations and possibly a nuclear war, the Army is emphasizing increased mobility. Richard S. Morse, assistant secretary of the Army (R&D), warns that battlefield mobility has lagged modernization of Army firepower and communications development. New concepts include:

A 10 year development program for Army aircraft, including light observation, manned surveillance, and tactical transport planes. Contractors are Grumman, Bell, Vertol, De Havilland, and Beech. The Army is seeking contractors for a new, turbine driven, observation helicopter and a "flying crane." The latter would be capable of vertical takeoff and landing, carrying an 8 to 12 ton load 25 miles.

Ground mobility is focused on the ability to carry anything anywhere. Sahara sands, polar ice, or Southeastern Asian jungles must be conquered by tanks, personnel carriers, and mobile missiles. The "Goer" program is designed to make maximum use of components for commercial, earth moving, and heavy construction vehicles. What the Army calls "true" off-the-road mobility has been obtained so far in two "Goer" prototypes: A 5000 gallon tanker and a 15 ton cargo carrier.

Mobile weapons research continues on the Sergeant surface-to-surface missile (Sperry Rand), the Shillelagh gun-launcher (Ford's Aeronutronic Div.), and the Mauler air defense missile (General Dynamics). Studies are being conducted on: Ground effect machines; Missiles "A" and "B" to replace current operational field missiles; and a field army, ballistic missile, defense system.

Blue sky research is going on in areas like PAT (plenum air track), where the vehicle runs on a continuous track of rubber impregnated cells filled with low pressure air. Chance Vought will build a half-scale test bed. Mobility receives special attention at the Land Locomotion Laboratory, Army Ordnance Tank-Automotive Command, Center Line, Mich.

• **Missile Development**—Of course, missiles remain accountable for more than 50 per cent of the Army's research budget, including Pershing, Mauler, Nike Zeus, and Advent. In fiscal 1962, Pershing will cost the Army $87 million, Nike Zeus about $200 million.

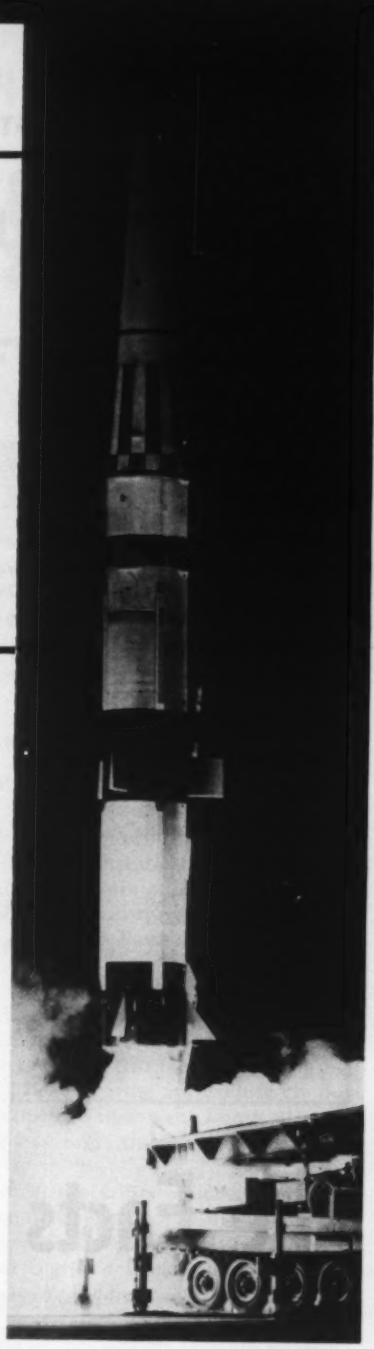
Production money for Nike Zeus (Western Electric), is still lacking as top brass in the Defense Department refuse to allow the anti-missile system to go into prototype production on the potential $7 billion program. Martin only last month received a $70 million contract to complete tests on Pershing and begin production. Advent, the Army space communications satellite program (General Electric is the main contractor), promises to grow far beyond the $100 million or so planned for this year.

• **QDRI Program** — Contractors wise to the ways of the Army have been watching the developing QDRI (Qualitative Development Requirements Information) setup. More than 700 firms have qualified through the White Sands (N. Mex.) Missile Range to submit ideas for Army missile programs. Under the

New Army Look:

Battlefield Mobility

The Pershing missile is going into production at Martin Co., Orlando, Fla., with completion of the test phase. Only four tracked vehicles are required to move the missile into firing position and launch it. Or it can be delivered by helicopter. Last month, Martin received a $70 million contract to start delivery to combat units. About 47 per cent of the Pershing contract dollar goes to subcontractors.



QDRI setup, established in 1958, the Ordnance Corps comes up with specific Army needs for contractors. Examples of problems: Measurement of blast phenomena at high altitudes, recovery of missile fragments, recovery and re-use of missiles from tests. The program has grown to the point where 16 new companies join each month. At least half of them qualify as small businesses.

• **Procurement Policies**—Brig. Gen. Fred Thorlin, commander, Ordnance Tank-Automotive Command, discusses these aspects of Army procurement policy: Ordnance spends about half the procurement dollar, Quartermaster Corps (not included in figures in the checklist on Page 59) about 25 per cent, and the technical services, about 25 per cent.

Small business is receiving increased attention from the Army following recent directives of the Defense Department. Labor surplus areas receive extra special attention. Weapon systems (Pershing, Mauler, and so on) will be checked and rechecked to see if more components cannot be "broken out" from the prime classification to allow direct contracting between the Army and small business.

When sole source contracts are deemed advisable, the Army plans to speedily develop specifications and drawings for the system or component to open them up to competitive bidding. Large primes will be "encouraged" to subcontract with small firms, especially in distressed areas. Primes must report periodically on the amount of awards subcontracted. Advance publicity to proposed procurement is getting more emphasis. Primes are requested to use the Commerce Department *Synopsis* when seeking subcontractors.

• **War on Costs** — Cost reduction remains the service's single biggest problem. Always hampered by budget restrictions from Congress or the Defense Department, the Army continually seeks ways to encourage its systems managers to reduce costs. The Army seeks industry's support in this effort; firms which co-operate are certain not to go unnoticed. General Thorlin establishes these criteria for the Army contractor:

1. Eliminate costly frills. 2. Primes should seek wider competition among subcontractors. (Primes must make available drawings to potential subcontractors at the earliest possible date.) 3. Incentive contracts will be used judiciously, making it profitable for the contractor if he reduces costs, and providing penalties if he overruns his costs.

Growing Opportunities In Defense . . . No. 2

This is the second in a series of articles outlining metalworking's growing opportunities in the defense market. Space markets were described Aug. 21, p. 29. Coming up in future issues: Navy, Air Force.

Extra copies of these articles are available until the supply is exhausted. Write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

How Steelmakers Have Fared Since 1958

Quarters	Operations % of Capacity	Employment Cost per Hour[1]	Output per Manhour Index*	Employment Cost per Ton Index**	Return on Equity[2]	Wholesale Price Steel Mill Products Index***
1961						
2nd	66.2	**$3.96**			7.2%	**187.3**
1st	52.7	**$3.96**	132.6	**198.0**	3.1	**187.6**
1960						
4th	50.4	**$3.794**	121.2	**204.6**	5.1	**187.6**
3rd	52.5	**$3.794**	124.6		4.0	**187.6**
2nd	70.2	**$3.816**	136.7	**176.2**	8.0	**188.2**
1st	93.8	**$3.816**	150.4	**176.2**	13.9	**188.3**
1959						
4th	56.3	**$3.976**	132.2	**233.1**	6.4	**188.3**
3rd	22.1	**$3.976**	93.8	**233.1**	5.5	**188.1**
2nd	91.8	**$3.708**	160.2	**159.6**	19.0	**188.1**
1st	83.8	**$3.708**	147.4	**159.6**	13.2	**188.3**
1958						
4th	73.6	**$3.610**	132.2	**184.8**	11.7	**188.1**
3rd	60.3	**$3.610**	126.3	**184.8**	7.5	**186.3**
2nd	54.0	**$3.411**	126.5	**184.1**	7.4	**183.1**
1st	54.1	**$3.411**	119.2	**184.1**	5.7	**183.2**

1. Includes payroll costs and fringes. 2. Annual rate, after taxes. *1947=100. **1st qtr 1947=100. ***1947-49=100.

The Facts Senator Gore 'Forgot'

WHAT Sen. Albert Gore (D., Tenn.) didn't emphasize to his fellow senators in his blast at steel industry prices was that the 10.5 per cent return on equity (after taxes) the industry has averaged in the last 14 years was equaled or bettered in only four quarters since 1958.

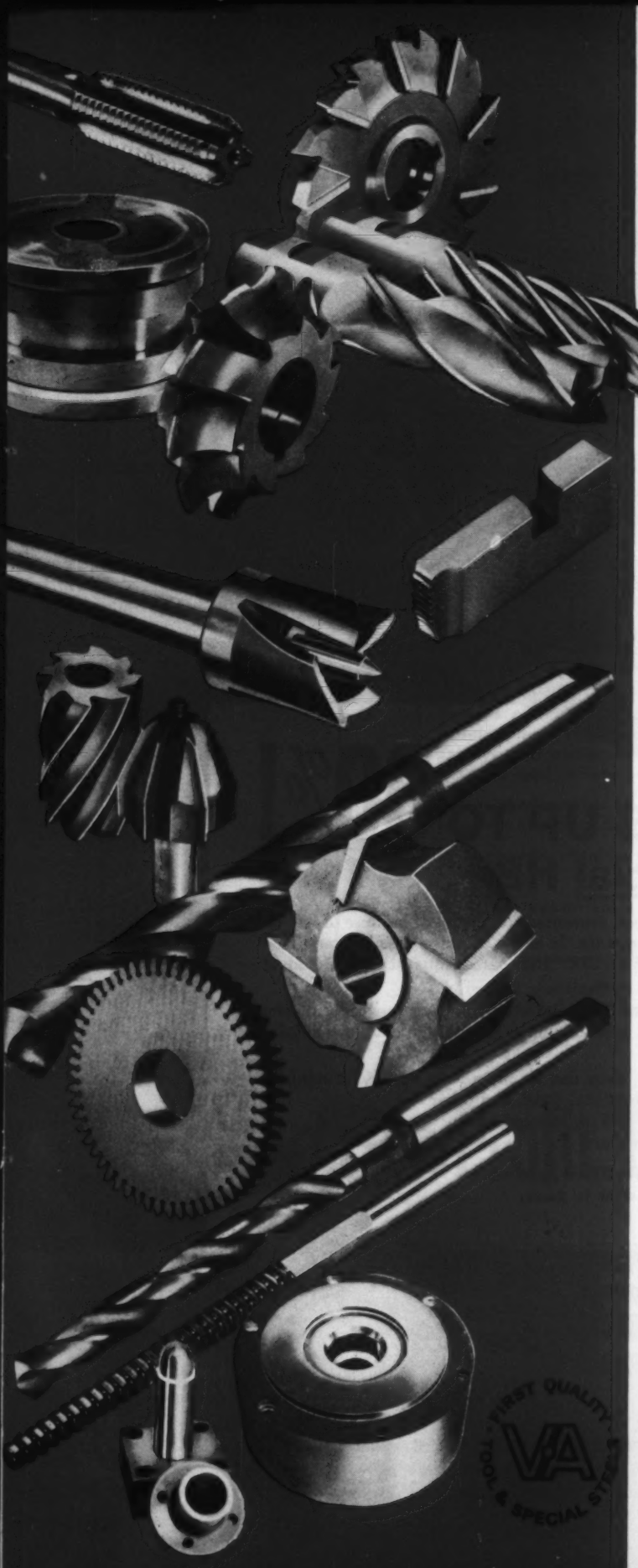
The chart above comes from the President's Council of Economic Advisers. It's the one referred to by the senator and other Democrats on the Senate floor.

Omitted too was any reference to the fact that the industry's employment costs have increased about 16 per cent while steel mill products at the wholesale level have risen slightly more than 2 per cent. Estimated employment costs will go up to $4.06 an hour in the final quarter, the council's report says.

● **KENNEDY'S REMARKS**—As the steel price story came to a head in Washington, President Kennedy commented at his press conference: ". . . The inflation which marked our economy before 1958 was, I think, tied very closely to the increase in steel prices . . . My economic advisers inform me that it would be possible for the steel companies to absorb the increase (in wages on Oct. 1) without increasing prices . . . I am concerned that an increase in steel prices would set off another inflationary spiral."

The consensus among industry observers in Washington is that the White House has made its point, although it did not follow the Gore line to the letter. A price boost, even a "selected" one, will become a political football in the next session of Congress, if the wholesale price index turns up a notch.

No one takes seriously the proposal by Senator Gore to break up the big companies nor to impose utility type legislation. But the weight of the White House could be tremendous if Mr. Kennedy should go all out.



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RED CUT COBALT	VASCO M-2
VAN CUT	RED CUT SUPERIOR
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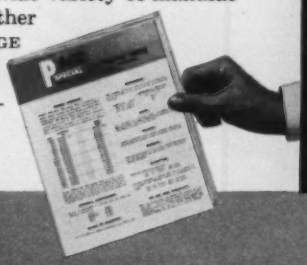

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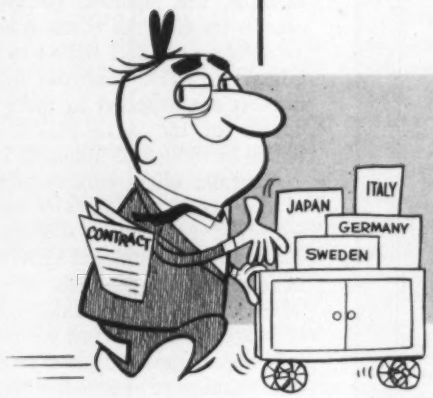


Why Export?

Here Are Ten Good Reasons

1. **Only 6 per cent of the world's population lives in the U. S.**
2. **Since 1953, U. S. industrial production has risen about 20 per cent; the increase has been 70 per cent for the rest of the world.**
3. **By 1965, world steel capacity will total 572 million net tons; 3½ times U. S. capacity of 160 million.**
4. **For every $7 in domestic sales last year, U. S. machine tool builders chalked up $3 in export sales.**
5. **Exports account for about one-seventh of our output of agricultural, printing, and food product machinery, one-fifth of our textile machinery and trucks, nearly one-third of our civilian aircraft and construction and mining equipment.**
6. **It's a small world. Chances are that you can fly to Rio de Janeiro in about 10 hours, to Berlin in 10, to Tokyo in 15, to Melbourne in 16.**
7. **U. S. exports should approach $40 billion annually by 1970, double today's figure.**
8. **Profits on export sales generally equal or exceed those on domestic sales.**
9. **The U. S. government is promoting exports as never before.**
10. **The world standard of living is rising. Example: The number of telephones in the world will total 500 million by 1980 vs. 133 million today.**

Export for Profit Growth—I

"WHEN Wendell Willkie created his one world theme, it sounded like a political rallying point. Today it's a reality few marketing men can ignore."

That assertion by Chris J. Witting, vice president, Westinghouse Electric Corp., is both a promise and a warning. It's a promise of growing markets to the aggressive firm that keeps pace with market changes; it's a warning to others that, as Mr. Witting puts it, "our survival depends on the action we take in this brave new world of the present."

• **Challenge**—The time is ripe for exporting. As Arno H. Johnson, vice president, J. Walter Thompson Co., points out: "The potential expansion of living standards and a parallel growth in demand for industrial plant and equipment . . . can mean a world trade and travel boom of a size and velocity beyond anything we have experienced in the past."

U. S. merchandise exports, already totaling $20 billion annually, should double by 1970.

In this article, we'll deal with opportunities in the highly industrialized countries; market potential

Basic Facts on 16 Major Markets

	Population (In millions)†	Gross National Product (Billions)[1]	KW-HR Produced (Millions)[2]	Per Capita GNP
Australia	10.3	$18.4	2.04	$1780
Austria	7.1	5.7	1.10	800
Belgium	9.2	11.9	1.26	1290
Denmark	4.6	5.8	0.41	1260
Finland	4.5	4.5	0.73	1000
France	45.5	55.2	6.17	1210
West Germany	53.4	66.5	9.91	1240
Italy	49.4	31.2	4.52	630
Japan	93.4	39.4	9.62	420
Luxembourg	0.3	0.5	0.12	1670
Netherlands	11.5	11.2	1.38	970
New Zealand	2.4	3.5	0.56	1460
Norway	3.6	5.0	2.58	1390
Sweden	7.5	11.8	2.90	1570
Switzerland	5.3	8.3	1.58	1570
United Kingdom	52.4	70.0	9.90	1340
United States	180.5	504.4	70.04	2790

1. Because of deficiencies and inconsistencies in national estimates, GNP data for all countries may not be parallel. Above estimates for 1960 are at current prices and current exchange rates. 2. Monthly averages for 1960. †Midyear, 1960.

Source: International Monetary Fund, United Nations, Booz, Allen & Hamilton, U. S. Commerce Department.

in the developing countries will be the subject of a Sept. 25 STEEL report.

The Boom Abroad

The 13 countries in the European Common Market and Outer Seven already have a combined gross national product (GNP) of about $275 billion. Their total population exceeds 260 million. And their rate of growth in metalworking production substantially exceeds that of the U. S.—all of which adds up to the promise of Europe becoming an even better customer for the U. S.

The boom in Japan is equally impressive; never before has Asia witnessed such dramatic industrial growth. Last year, U. S. exporters sold $1.3 billion worth of goods to the Japanese, and the market will continue to expand dramatically. For example, the Japanese government expects its GNP to climb from the 1960 figure of $38.7 billion to $72.2 billion in 1970. And the nation's imports are expected to more than double in the same period ($4.5 billion in 1960; $9.3 billion in 1970).

Australia offers another example of the boom abroad. The nation's industrial production, national income, and international exchange of merchandise set records in 1960. The U. S. sold $387 million worth of goods in Australia last year; about half were metals and metal products. The number of Australian factories rose from 27,000 in 1939 to 57,000 in 1959.

Is U. S. Shut Out?

There is considerable conjecture that the formation of common markets throughout the world will seriously damage U. S. exports. While it's too early to draw conclusions either way, it's important to recognize the plus factors for the U. S. that are inherent in these common markets. First, such economic unions tend to accelerate the rate of industrial growth of the countries within them, enlarging the potential market for U. S. exports. Second, such groups don't prohibit imports, but, through tariffs, they force pricing of imported goods at a premium. The premium can be mitigated by the U. S. producer who builds qualities into his product that make it more appealing than competitive items—or by the U. S. producer who boosts his productivity enough to offset the premium. Third, the industrial cost gap between the U. S. and other nations should narrow. Fourth, as the trading blocs become more securely established, they will likely give more consideration to U. S. pressure for tariff reductions. Fifth, the U. S. continues supreme in the ability to pioneer and market specialized articles. For example, we produce some types of steelmaking equipment, machine tools, special alloys, agricultural equipment, chemicals, and electronic items that simply are not available from any other source. And we have significant engineering advantages in some durable goods. Sixth, prospects for U. S. business in the underdeveloped countries are continually improving.

Outstanding U. S. exporters illus-

trate how exporting pays off . . .

• **Allis-Chalmers Mfg. Co.**—While total sales in 1960 fell about 2 per cent, exports rose 33 per cent to $62 million.

• **Merck & Co.**—Earned 37 per cent net income from foreign subsidiaries in 1960.

• **Philip Morris Inc.**—It's rare to see figures on how any one overseas subsidiary is doing. Philip Morris (Australia) Ltd. is an exception. Founded in 1955, the firm earned $151,000 in fiscal 1957 and $518,000 last year.

• **General Electric Co.**—Chairman Ralph J. Cordiner predicts that GE's foreign sales will rise from the current level of $600 million annually to $1 billion annually by the mid-1960s.

• **Cahn Instrument Co.** — After only three years in foreign markets, its overseas sales account for 20 per cent of its volume.

• **Gillette Co.**—Of 9700 employees, 5900 are in foreign operations. Among U. S. industrial corporations, the firm ranks 216th in sales, 73rd in profits, and 12th in profit as a percentage of sales.

Where Are the Markets?

If you decide to investigate your export potential, how do you find out which countries would be your best markets? (The firm entering the foreign market for the first time is in about the same position as the new sultan entering his harem for the first time: Neither knows where to begin.)

Here are a few of the many sources from which you can get information on marketing potentials in industrialized (and developing) countries:

1. Your commercial bank's foreign department, especially if you have a New York bank. Chase Manhattan Bank and First National City Bank of New York can provide considerable data.

2. Your local Commerce Department field office. It can point out specific exporting opportunities, can help locate importers, agents, and distributors abroad, can provide specific data on some foreign firms, can advise on the type of organization to set up for exporting, can furnish information on import regulations, can give details on packing, shipping, and insurance. The Commerce Department's *Foreign Commerce Weekly* lists export opportunities.

3. You can buy counseling or marketing services. Examples: S. J. Rundt & Associates, New York consultant on international business, issues *Weekly Intelligence Briefs* on economic, financial, and political happenings in foreign lands. And *Rundt's Market Reports* are comprehensive analyses of the business picture in specific countries.

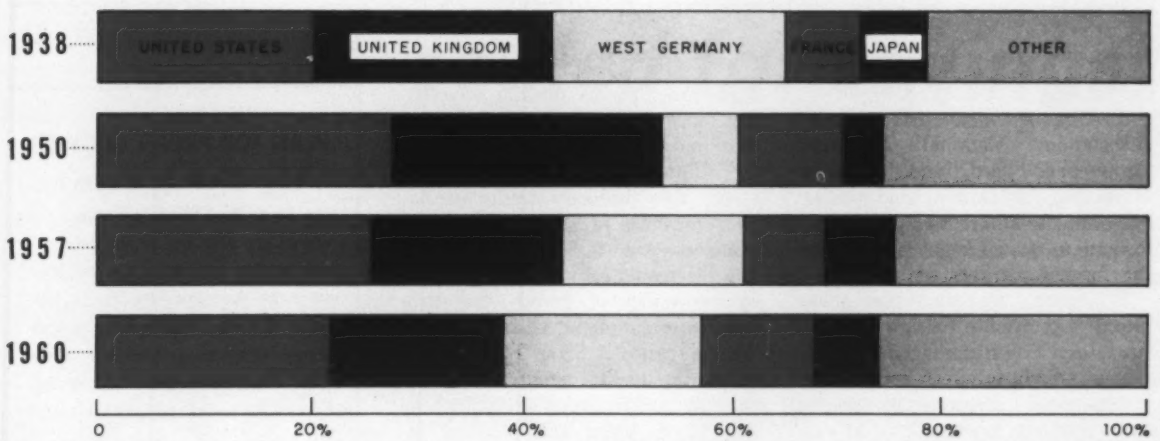
4. Business publications too can be of assistance. STEEL's forthcoming sister publication, STEEL INTERNATIONAL (first regular issue: January, 1962), is building a library of marketing information.

5. To gain the knowledge of tastes, customs, political organization, religion, climate, transportation facilities, and other factors important to your success in foreign markets, you might study such volumes as *The Worldmark Encyclopedia of the Nations* (Harper & Bros., New York, $35). You can also find good books on specific countries. Example: Missions organized by the International Bank for Reconstruction & Development publish their reports in book form (Johns Hopkins Press, Baltimore). Some books have been published on the legal problems you might encounter abroad. Example: The University of Michigan has published a two volume set called *American Enterprise in the European Common Market: A Legal Profile*, which is designed to give an over-all picture of the Common Market's legal framework and the laws on business organization, labor relations, property, competition, and taxation which prevail there.

6. The United Nations is a virtual mine of economic information on member countries. Its *Monthly Bulletin of Statistics* gives data on such subjects as industrial production, population, external trade, wages and prices, exchange rates, money supply, gold and foreign exchange holdings, national income, and employment.

7. The U. S. commercial attache in the country in which you're interested is a good man to contact. So is that nation's commer-

Competition for the World's Manufactured Goods Market*



*Distribution based on exports of manufactured goods by 11 major countries. "Other" countries not shown separately include Canada, Italy, Sweden, Switzerland, Netherlands, and Belgium-Luxembourg.
Source: National Industrial Conference Board.

AMF Execs Give Tips on Entering Overseas Markets

GORDON O. FRASER
Executive vice president
AMF International

DONALD W. MORISON
Director of marketing
AMF International

AFTER WORLD WAR II, Japan needed food. The U. S. supplied wheat. The Japanese developed a taste for bread. American Machine & Foundry Co. recognized the change in eating habits and has sold a large volume of bakery machinery in Japan.

That illustrates one of myriad ways in which AMF has built a giant international organization. Foreign markets have provided much of the impetus that has boosted the company's net income from $5.8 million in 1955 to $24.1 million in 1960. From 1956 through 1960, sales of AMF International rose 361 per cent (while AMF's domestic sales increased by 49 per cent). AMF International expects 1961 sales to jump 54 per cent above the '60 level (while AMF's domestic sales are expected to rise 16 per cent).

• **Bowling**—AMF has more than 4000 Pinspotters installed or on order outside the U. S. and Canada. In some countries—Sweden, England, Switzerland—AMF opened bowling centers itself to introduce the sport to the nationals. In other countries—Belgium, for example—AMF has helped proprietors open their centers. In still other countries—Australia, for example—the sport became popular with little urging from AMF. "They were literally beating on our door," says Mr. Fraser. He believes the potential market for bowling equipment in Western Europe is as great as the U. S. market—where more than 125,000 lanes are in operation.

• **Service**—A key ingredient in AMF's juicy, international success pie has been the strategical placement of trained service technicians and replacement part centers.

• **U. S. Style**—"We think a U. S. trademark is a definite plus in most overseas markets," says Mr. Fraser. So the firm's overseas advertising seeks to create the image of AMF as a U. S.-based international organization.

• **Design for Market**—One of the most important—and most often overlooked—essentials to exporting success is designing products specifically for the intended market. AMF does it. Example: Since the protein content of wheat varies from one part of the globe to another, AMF adapts its automatic baking machinery to the protein content in each area. And it has built special automated cigarmaking machines—for example, to produce "Stumpens," preferred in Germany and Austria.

• **Challenge of Change**—AMF points out that "industrial survival is determined by your ability to adapt to changing conditions." That has special application in foreign markets. As Mr. Fraser puts it: "As product lines get older, to meet competition from foreign sources, you must usually manufacture abroad. But newer products must replace them in your export structure." Example: AMF's success in exporting tobacco machinery is legend, but more and more of it is now being made in the firm's foreign facilities. And newer items, such as nuclear reactors and special nuclear handling systems, are filling the gap in exports. Mr. Morison adds: "We have proved conclusively that the establishment of overseas subsidiaries has increased our exports by stimulating sales of U. S. products at the local level."

• **Profit Payoff**—Doesn't low wage competition abroad force the U. S. exporter to trim his margins on foreign sales? Answers Mr. Fraser: "We have been able to maintain profit margins on exports as good as those on domestic sales."

cial attache in the U. S.

8. The American Management Association, National Industrial Conference Board, and American Marketing Association hold conferences and seminars and publish information on approaches to entering foreign markets.

9. Some manufacturers have found it profitable to sign up with specialized export-management companies, which, in effect, serve as the international divisions of several firms that are too small, or unwilling, to maintain their own organizations. Those concerns handle such functions as placing advertising, locating overseas distributors, working out credit terms, and routing shipments.

10. Your industry trade association may be of some help. The American Iron & Steel Institute and the Electronic Industries Association are examples of groups that provide information for their members. The Institute of Scrap Iron & Steel circulates to its members lists of foreign steel mills interested in buying U. S. scrap and provides information on how to get government export licenses.

PLAN FOR PROFIT GROWTH

Export for Profit Growth II

On Sept. 25, STEEL will point up export opportunities in the developing nations and give tips on how to enter those markets. For a free copy of any or all articles in this series (appearing biweekly since Jan. 16), write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

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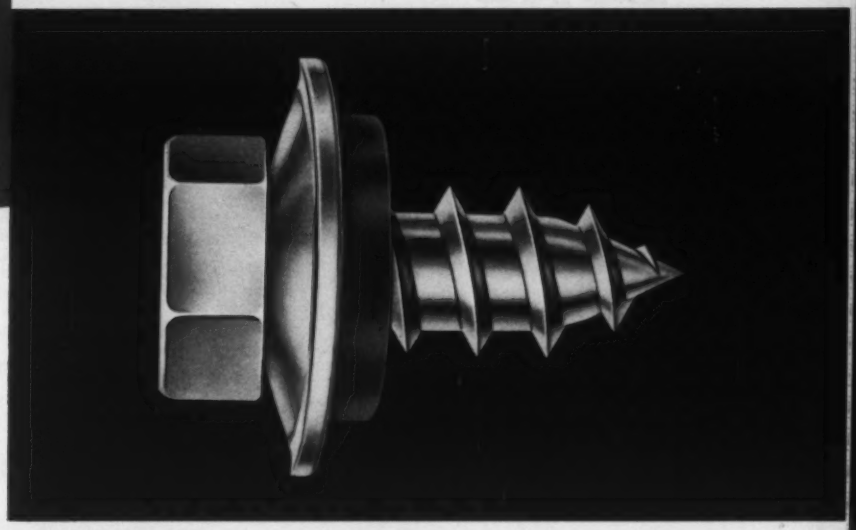

sealed for savings

In the steel building industry, leaking roofs mean leaking profits. GLS field engineers, studied this problem at the job site to determine the cause and perfect the cure. The result of this field development project is the positive sealing "Poz-i-seal" sheet metal screw. GLS engineers can plug *your* profit leaks by designing custom fasteners to meet your exact manufacturing needs. Standard products - though cheap to buy - are costly to use and even more costly to remove and replace when failure occurs. If you have a special fastening problem - let GLS seek the solution for you - and develop the cure. Custom made fasteners put the lid on high costs. They are *sealed for savings.*

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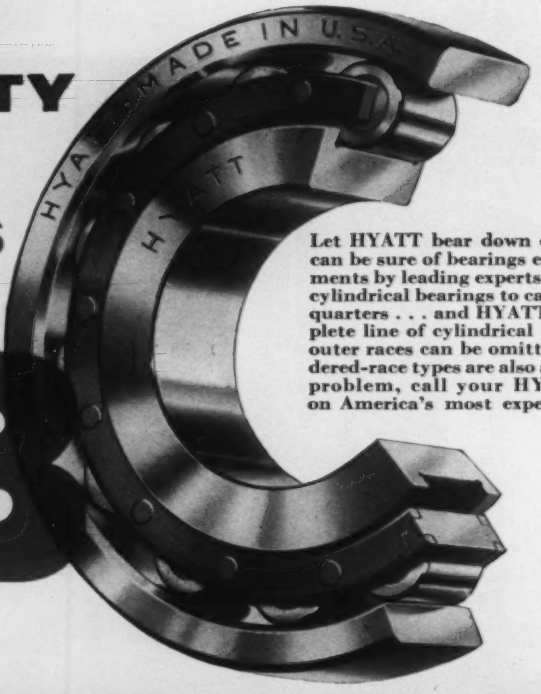
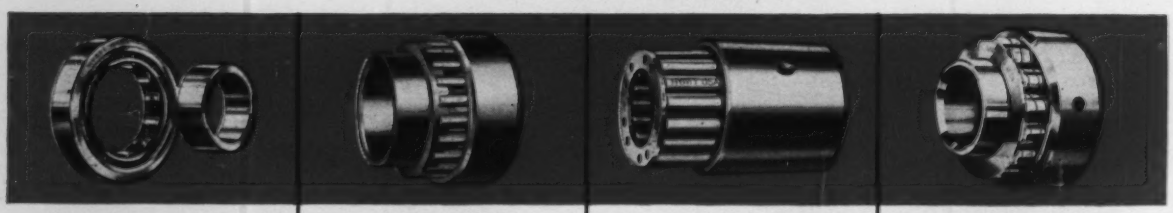


Let HYATT bear down on your bearing problems. You can be sure of bearings engineered to your exact requirements by leading experts in the bearing business. It takes cylindrical bearings to carry high radial loads in cramped quarters . . . and HYATT HY-ROLLS are the most complete line of cylindrical bearings in America. Inner and outer races can be omitted from separable types. Shouldered-race types are also available. Whatever your bearing problem, call your HYATT Sales Engineer. Depend on America's most experienced bearing manufacturer.



METRIC SERIES

Heavy radial loads . . . light or intermittent thrust loads? Use high capacity HYATT cylindrical roller bearings.

INDUSTRIAL INCH

These HYATTS fill the bill where large-diameter shafts are usually employed for slow-moving, heavily loaded machinery.

TRUNNIONED ROLLER

HYATTS specially designed for industrial trucks, textile machinery, gear pumps, conveyors, hoists, agricultural equipment, etc.

WOUND ROLLER

A HYATT design—three-part separable bearing which provides maximum resistance to shock, abrasion and fatigue.

SIZES

You'll find HYATT BEARINGS in a wide variety of types and sizes from ¾" OD to 14" OD.

LOADS

HYATT BEARINGS are designed for any radial loads ranging from the lightest lawnmower to heavy-duty types used in industrial cranes —up to 103,000 pounds.

SPEEDS

From slow-moving construction equipment to jet engines for planes reaching supersonic speeds, use HYATT BEARINGS. Top speed design—50,000 RPM.

TEMPERATURES

HYATT BEARINGS are designed for operation from below zero to 450° F.—using heat-treated conventional steel. Special high-temperature steels can be used.

Delco-Hyatt replacement bearings distributed nationally through authorized **Delco-Hyatt** distributors.

THE RECOGNIZED LEADER *IN CYLINDRICAL BEARINGS*

GM GENERAL MOTORS

HYATT HY-ROLL BEARINGS FOR MODERN INDUSTRY

HYATT BEARINGS DIVISION, GENERAL MOTORS CORPORATION, HARRISON, N. J.

Austerity Cars Fade as Detroit Gets Plushier

IT'S PRETTY evident that autodom still isn't exactly sure what size and type cars will attract buyers in each price class. Several divisions are lengthening their cars and adding more models. Others have cut back the size and the number of cars they'll offer. But one thing is certain. Carbuilders are convinced that recession-spurred demand for "strictly utility" transportation is giving way to an eagerness for fancier models, hotter performance, and more gadgets.

The shift makes metalworking happy because it means more business for accessory and trim suppliers. Forecasts that '62 model production will top the 1961 mark by 1 million cars indicate steel shipments into auto plants could increase 20 per cent during the period.

Here are some notes taken at car previews.

Report from South Bend

Studebaker-Packard Corp. (which plans to drop the Packard name) has stretched all its ladder frames 3 in. to handle longer body shells and wheelbases. Heavier gage steel is used on the four door sedan frames to boost strength 30 per cent.

Sedans have been lengthened 9 to 13 in. Station wagons have been stretched 2½ in. Object: To give the stubby cars a sleeker appearance, says Sherwood H. Egbert, president.

A sports car model has been added and several types of utility cars dropped from the series. The engine lineup offers minor improvements.

Lark continues to use stamped, plated steel grilles with the same configuration as this year. Stainless side moldings and plated zinc diecastings for ornaments and taillight bezels will be retained. Aluminum extrusions are used to cover Hawk rocker panels. All cars will be equipped with aluminized mufflers.

Station wagons have new rear quarter panels featuring pod type, circular taillight housings. Rear deck lids on the other Larks have been altered for easier trunk loading. Biggest change is the luxury Hawk series which will sport a Thunderbird type roof which Studebaker says first appeared on the Packard Predictor dream car of 1956. Company sources indicate the sleek car will be priced at least $400 less than comparably equipped T-birds.

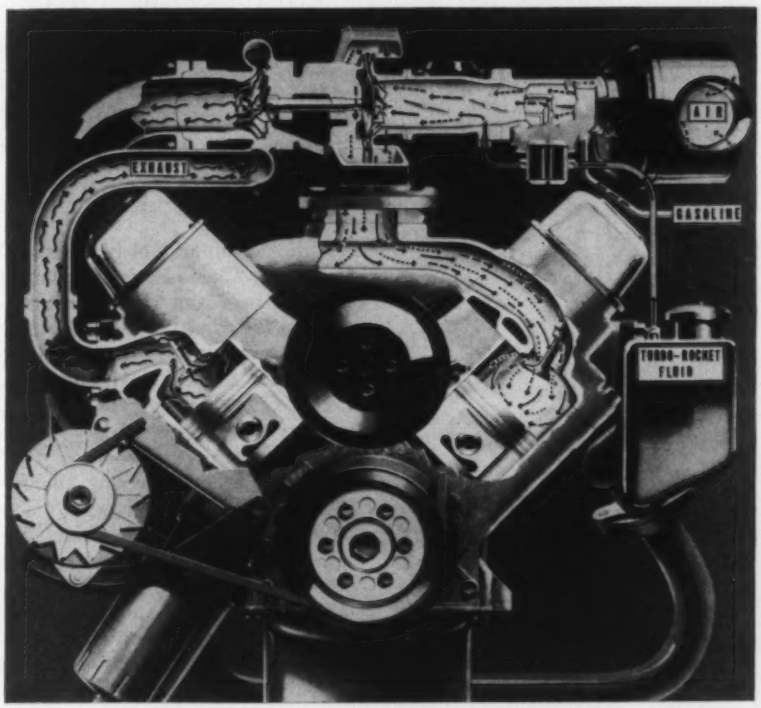
The company plans to build at a rate of 65 cars per day the rest of this year. So it will wind up the year with 85,000 cars vs. 106,000 last year.

For 1962, Mr. Egbert is thinking in terms of more than 120,000

Oldsmobile Introduces Turbocharged V-8

BY ADDING a special fluid to provide uniform burning and by forcing the fuel air mixture into cylinders with a turbine type supercharger, General Motors' Oldsmobile Div. gets 1 hp/cu in. displacement out of its 215 cu in., aluminum V-8 engine at a 10.25:1 compression ratio. The power to weight ratio is 1.88 lb/hp.

The powerplant will be available on a limited production sports car. Unlike conventional superchargers, the turbine operates from exhaust gas instead of taking power directly from the engine. Dotted arrows show fuel flow; solid arrows indicate injection fluid flow; and curved arrows trace the path of exhaust gases that drive the turbocharger.



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units—1.8 per cent of a 6.5 million year.

Rambler Reduces Lineup

American Motors Corp. will offer 29 models vs. 41 this year. In most cases, stripped down cars were eliminated. They have been meeting strong sales resistance from luxury minded buyers. Trim formerly confined to more expensive models will be standard on lower priced jobs.

The 117 in. wheelbase has been dropped and Ambassador models, which are 9 in. shorter, will be built on the 108 in. Classic wheelbase. That gives AMC just two basic body shells, so it can concentrate more on interior styling and mechanical improvements.

A king sized, 327 cu in. V-8 with special drive train will be available for the Ambassador to give it extra hot performance. The six cylinder, aluminum engine will be standard on top models of the Classic series.

Hydraulically operated, adjustable seats will be optional. New mechanical features include separate hydraulic systems for front and rear brakes and a hydraulically actuated semiautomatic transmission for the 100 in. wheelbase American. That job does away with the clutch pedal and will be sold for about $55, one-third the cost of the automatic shift.

Instead of a stamped aluminum grille, the American will return to a plated, zinc diecast faceplate. Equally coated, galvanized steel will be used on rocker panels on all cars. Interior panels of the station wagon cargo space have been switched, plastic replacing steel.

AMC's outlook for fiscal 1962 (12 months ending Sept. 30) calls for 500,000 unit sales compared with an estimated 385,000 this year. The record: 423,127 units in fiscal 1960.

Ford, Chevrolet Changes

To reduce costs, Chevrolet will be machining the blocks for its four and six cylinder, gray iron engines on the same line. Parts like connecting rods and pistons will be interchangeable between the 153 and 194 cu in. engines and Chevy's 327 cu in. V-8 powerplant. This V-8 will replace the 283 cu in. jobs in the cars and the 348 cu in. truck engine. A 212 cu in., four cylinder diesel will be introduced for trucks. A V-6 diesel will follow later this year.

At Ford, the 221 cu in., gray iron V-8 follows the weight saving design practices of the Falcon engine. It weighs 465 lb. The machined block weighs only 120 lb, 50 lb lighter than the division's older, 292 cu in. V-8. Ford foundrymen say the company has tested several hundred nodular iron blocks.

U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,241
April	446,739	582,869
May	542,303	611,260
June	599,474	613,136
July	399,157	434,377
August	195,266†	305,514
8 Mo. Totals	3,371,140†	4,549,385
September		407,691
October		617,972
November		597,638
December		523,422
Total		6,696,108

Week Ended	1961	1960
Aug. 5	32,464	103,504
Aug. 12	21,029	84,139
Aug. 19	16,948	47,437
Aug. 26	61,401	38,952
Sept. 2	90,809†	51,647
Sept. 9	100,000*	52,635

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

Although aluminum is still slated for grilles, Chevrolet is using more stainless steel and plated zinc diecastings for trim. It offers the single leaf, tapered springs for rear suspension on the Chevy II, and E. N. Cole, Chevy's general manager, predicts this type of spring will be used on other division cars too. Ford has made 188 engineering changes in the 1962 Galaxie alone. A new oil pump and mechanical, aluminum valve lifters are key examples. With lube jobs every 30,000 miles and oil changes every 6000, Donald Frey, Ford Div. product planning manager, says Ford cars are set for twice a year maintenance. Chevrolet is sticking with 4000 mile oil changes and 1000 mile lubrication.

Since the 2700 lb Chevy II is built on a 110 in. wheelbase, making it only 2 in. longer than the Corvair and 1 in. longer than the Falcon, it would appear to compete more directly with Ford's compact than it does with the new, 115.5 in. Fairlane, which is more competitive with standard Chevrolets. Corvair seems destined to become a personalized sports car based on the success of the Monza. Predictions are that the lowest priced Chevy IIs will be comparable to the Falcon in price and probably even less expensive than some Corvair models.

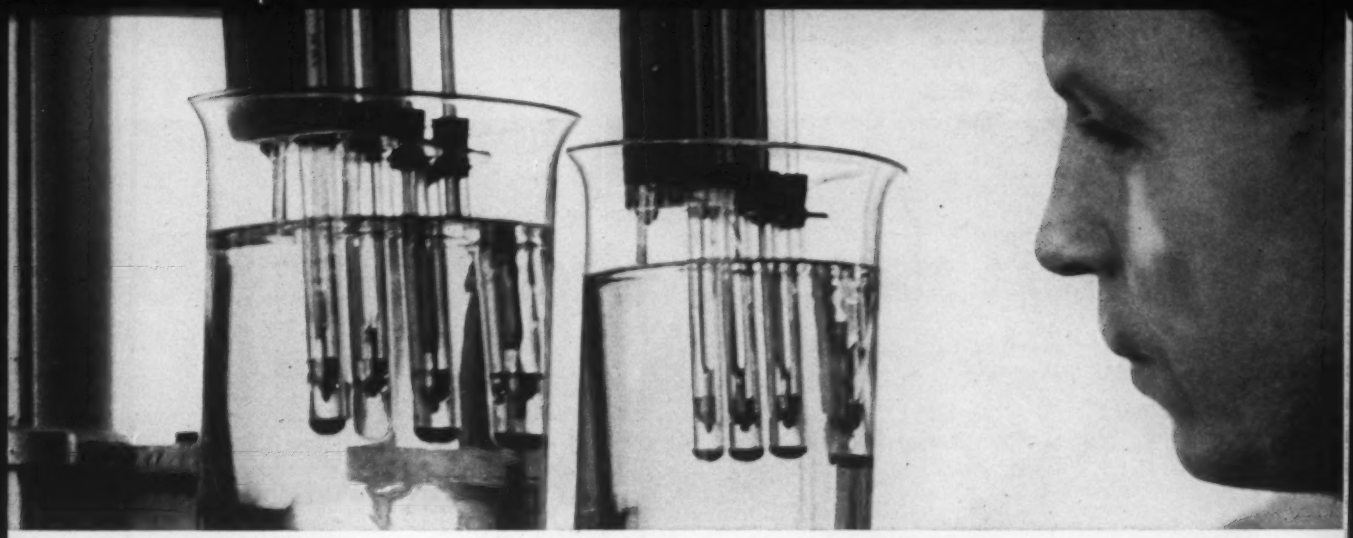
Olds-Pontiac

The Oldsmobile and Pontiac Divisions appear to be competing more with each other than with non-GM divisions. The regular Olds is 2 in. longer, the Pontiac 1.6 in. Both cars will have more stainless side trim and plated zinc diecastings for exterior ornamentation.

To bolster performance, Pontiac will offer a 303 hp engine in its new, luxury, Grand Prix model. The economy priced Ventura series has been dropped. Olds will also have a powerpack job. The compression ratio of the Dynamic 88, economy engine has been boosted from 8.5 to 10.25:1. Only its compact F-85 will use regular gasoline.

The divisions have had considerably different sales experience with their compacts, which are built on the same body shell. Oldsmobile's F-85 is accounting for 27 per cent of sales. Pontiac's Tempest is winning 43 per cent of that division's volume.

Part of the difference may be the extra cost of the aluminum V-8 engine which is standard on the F-85 but optional on Tempests. Semon Knudsen, Pontiac's general manager, reports only 2000 aluminum engines were sold in Tempests during the 1961 model year. He points to a $200 price difference between this engine and the four cylinder, gray iron job that is standard for this compact. Harold Metzel, Oldsmobile's chief engineer, agrees that the cost of aluminum engines must be reduced. He says the Olds powerplant is 25 per cent more expensive than comparable gray iron engines.



Dropping point test shows how greases react to heat. Beaker fluid has been heated to 390°F. All greases tested except Darina (second tube from left) have passed from solid to liquid state.

BULLETIN:

Shell reveals the remarkable new component in Darina Grease that helps it save up to 35% on grease and labor costs

Darina® Grease is made with Microgel*, the new thickening agent developed by Shell Research.

Darina lubricates effectively at temperatures 100° hotter than most conventional soap base greases can withstand.

Read how this new multi-purpose industrial grease can help solve your lubricating problems and even save you up to 35% on grease and labor costs.

THERE IS no soap in Darina Grease. No soap to melt away—wash away—or dissolve away.

Instead of soap, Darina uses Microgel—a grease component developed by Shell Research.

What Microgel does

Because of Microgel, Darina has no melting point. It won't run out of gears or bearings.

Compared with most conventional soap-base greases, Darina provides significantly greater protection under adverse service conditions.

Mix water into Darina and the grease does not soften. It shrugs off water—won't emulsify.

Resists heat

Darina will withstand operating temperatures 100° hotter than most conventional multi-purpose greases. It cuts leakage and reduces the need for special high-temperature greases.

Also, Darina resists slumping, thus forming a more effective seal against foreign matter.

Saves money

Shell Darina can reduce maintenance expenses while it protects your machinery. Savings of up to 35% on grease and labor are quite possible.

In some cases lubrication intervals have been extended to double what they were before. Less grease is consumed and less time consumed applying it.

For details, see your Shell Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

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SHELL

A BULLETIN FROM SHELL
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maximum tube life per dollar—When you buy Timken® seamless steel pressure tubing, you receive fine forged quality that is uniform from heat to heat, tube to tube, order to order. We target it to your end use. And our metallurgists draw from a background of over 40 years' experience to help you select the one tube that will give you maximum tube life per dollar.

Timken seamless steel tubing is available in carbon, alloy and stainless grades, up to 11" O.D. and 3¼" wall. And there's a Timken seamless steel pressure tube to meet practically any combination of temperature, pressure or corrosion. For help that assures your selection of the one tube that will be most economical and perform best for you, call in Timken Company metallurgists. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

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Optimism Boosts Economic Forecasts

ONE INDICATION of the swiftness of the economy's recovery is the extent businessmen and economists are upgrading their forecasts of industrial production and the gross national product.

Probably the most noteworthy example is the report from Luther Hodges, secretary of the Department of Commerce. He boosted his GNP estimate from $530 billion to $540 billion (annual rate) by the end of the year. At about the same time, the government released a new study of the 1962 economy, which predicted an annual rate of $600 billion for the GNP by the end of next year. It upgrades a prediction of $600 billion for the second quarter of 1963 made in this column three weeks ago (STEEL, Aug. 21, p. 49) and puts the economy 20 per cent above the low point of the recession in the first quarter of 1961.

● **One Year from Trough**—But this optimism isn't new. One source periodically tapped by STEEL—a group of bankers, economists, and business analysts which meets weekly to check the business pulse—said last April that the Federal Reserve Board's industrial production index would reach 110 (1957=100) by September. As the uptrend developed, the group became bolder and forecast a level of 115 by December. Two months later, the experts raised their sights to 118 by the end of the year, but hesitated about going into 1962. Last week, they took the leap. They expect at least 121 in February.

Although the initial speed of the recovery surpasses that of the three previous upturns, the 19 per cent boost predicted for a year from the trough is not particularly spectacular. The V-shape pattern of 1959-60 yielded a 23 per cent improvement in a year. Following the 1953-54 recession, the rise was only 11 per cent. But one year after the low of the 1947-49 recession, the industrial production index was 29 per cent higher—helped greatly by the Korean War buildup.

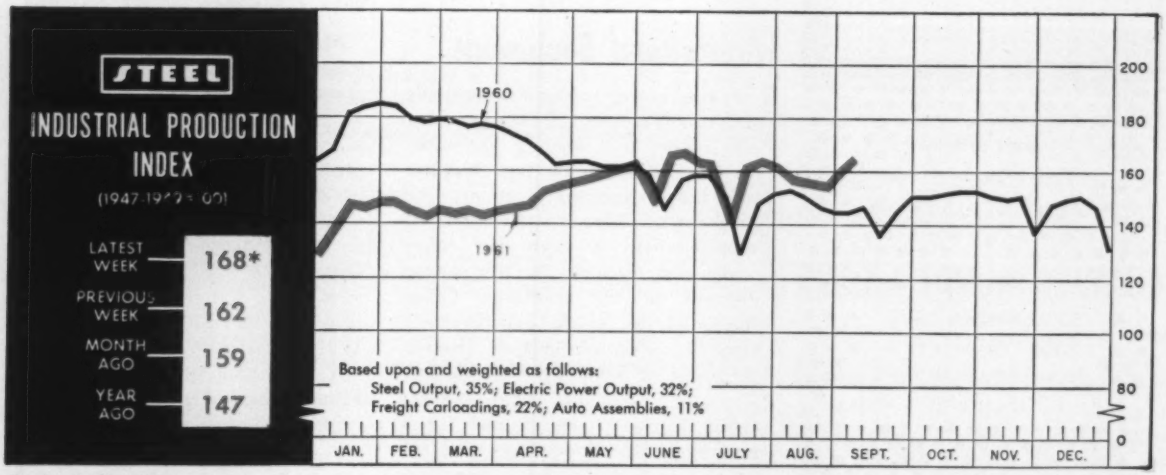
● **Still Higher**—It will not be surprising if the economists boost their sights several times before February gets here. Each time the monthly production figures show a bigger than expected gain—as in July—the optimism soars. And it should be remembered that many business spending plans are made on the forecasts of these economists. So this too could provide a stimulus to the economy later in the year.

In addition, nobody knows just what to expect from the Berlin buildup. It could provide the same kind of impetus that the Korean War did in 1950.

The realization in metalworking that business is better than many believe it is could bring more confidence to the one major industry which so far as shown the most skepticism about the recovery. There is the definite possibility that 1961 will be the record year for metalworking sales (see Page 55) despite a slow first quarter.

Barring any major setback, then, it is likely that the upgrading of forecasts will continue. It will take a reading of at least 132 on the FRB index to make this the most spectacular modern recovery from a recession.

● **It Brings Problems**—But such a swift upturn has its problems. For instance, the economists already are wondering what the Federal Reserve Board is going to do with interest rates. Inflation is the cause for concern. From trough to peak following the 1948-49 recession,



*Week ended Sept. 2.

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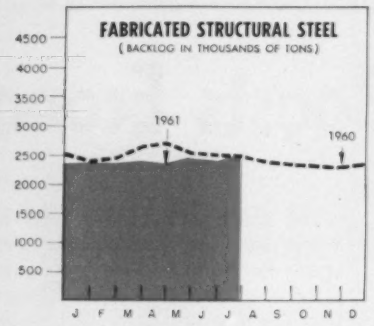
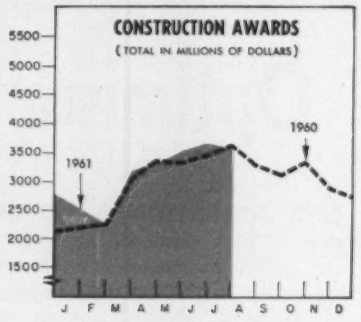
THE BUSINESS TREND





	Shipments 1961	Shipments 1960	Backlogs 1961	Backlogs 1960
Jan.	261.6	235.1	2,371.2	2,390.5
Feb.	260.2	270.9	2,357.4	2,473.8
Mar.	292.4	311.6	2,392.1	2,671.8
Apr.	318.7	322.7	2,377.5	2,713.4
May	365.0	320.1	2,457.8	2,528.2
June	361.2	374.2	2,414.7	2,507.5
July	286.9	338.9	2,517.1	2,489.8
Aug.	....	373.4	.....	2,389.1
Sept.	....	363.9	.....	2,325.6
Oct.	....	352.8	.....	2,291.4
Nov.	....	324.7	.....	2,278.2
Dec.	....	276.9	.....	2,332.8
Total	....	3,865.2		

American Institute of Steel Construction.
Charts copyright, 1961, STEEL.

	Total 1961	Total 1960	Building 1961	Building 1960
Jan.	2,485	2,193	1,787	1,728
Feb.	2,235	2,240	1,674	1,685
Mar.	3,166	3,046	2,398	2,361
Apr.	3,297	3,360	2,504	2,527
May	3,501	3,337	2,658	2,563
June	3,602	3,472	2,779	2,593
July	3,529	3,597	2,656	2,481
Aug.	....	3,295	....	2,550
Sept.	....	3,119	....	2,402
Oct.	....	3,319	....	2,555
Nov.	....	2,886	....	2,169
Dec.	....	2,718	....	1,872
Totals	....	36,318*	....	27,345*

*Monthly figures do not add up to totals because of yearend revisions.
F. W. Dodge Corp.

wholesale prices advanced 13.3 per cent. Following the 1953-54 setback, inflation amounted to 5.8 per cent. It was not until the 1958-59 dip that inflation was stopped. While wholesale prices still are below the year-ago levels, the cost of living as measured by the consumer price index has advanced a little over one-half of 1 per cent so far in 1961.

However, the feeling is that as long as unemployment remains a problem and wholesale prices remain fairly stable, the Fed will do nothing to nip the recovery in the bud.

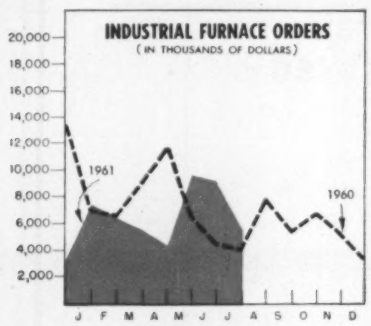
Agricultural Equipment

Forces are at work to reverse the downtrend in sales of farm machinery, report two leading manufacturers. Sales in the late summer were below expectations because the government reduced the number of acres planted in corn and other feeds and because of the severe drought in the Northern Great Plains of the U. S. and Western Canada. But William A. Hewitt, president of Deere & Co., Moline, Ill., says: "Farmers' gross cash receipts appear to be headed for a new high this year, and such increases historically have been reflected in increased sales of farm machinery."

Frank W. Jenks, president of International Harvester Co., Chicago, adds that stocks of farm equipment are at the lowest level in many years, which should result in considerably better machinery volume in the fourth fiscal quarter of this year. Mr. Jenks also reports that construction equipment sales in the third quarter were larger than in the year-ago period, and hopes for continued improvement.

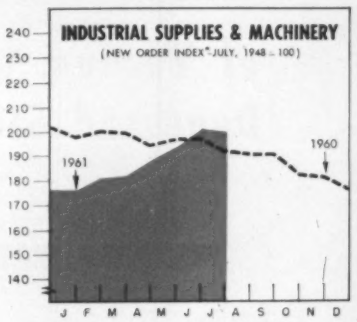
Gas Industry Sees Climb

Metalworkers allied with the gas industry can expect significant improvement in business in the decade of the 1960s. The Gas Appliance Manufacturers Association (GAMA) predicts that the gas industry will be serving 34 per cent more customers by 1970. "Signs of a record-shattering decade for the industry already are evident in the field of residential, commercial, and industrial gas air conditioning," states William G. Hamilton Jr., president of GAMA and American Meter Co., Philadelphia. He predicts that the number of residential gas heating and cooling customers of the utilities alone will increase 65 per cent



	1961	1960	1959
Jan.	7,291	6,827	4,545
Feb.	6,468	6,499	3,596
Mar.	5,535	9,033	7,842
Apr.	4,113	11,687	14,517
May	9,653	6,352	5,315
June	9,194	4,245	8,230
July	5,390	3,966	13,141
Aug.	....	7,840	9,738
Sept.	....	5,253	5,560
Oct.	....	6,634	12,867
Nov.	....	5,084	8,442
Dec.	....	3,248	13,437

Industrial Heating Equipment Assn. Inc.



	1961	1960	1959	1958
Jan.	176	198	186	163
Feb.	181	200	202	157
Mar.	182	199	221	149
Apr.	188	194	218	148
May	194	196	218	152
June	201	197	212	164
July	200	191	216	170
Aug.	...	190	212	172
Sept.	...	190	207	178
Oct.	...	182	204	187
Nov.	...	181	202	189
Dec.	...	176	202	190

*Seasonally adjusted.
Amer. Supply & Machinery Mfrs.' Assn.

by 1970, and similar progress is expected for homes served by L-P gas. Other forecasts for 1970 based on a report from GAMA's 582 members:

Industrial customers will total 240,000, up from 178,000 in 1960. Gross plant investment will reach $48.2 billion, up from $21.5 billion last year. Miles of mains, including pipe lines, will reach 924,200 compared with 632,130 in 1960.

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	2,050[1]	2,030	1,401
Electric Power Distributed (million kw-hr)	15,800[1]	15,491	15,353
Bituminous Coal Output (1000 tons)	8,040[1]	8,200	7,891
Crude Oil Production (daily avg—1000 bbl)	7,050[1]	7,054	6,824
Construction Volume (*ENR*—millions)	$402.1	$323.5	$604.0
Auto, Truck Output—U. S., Canada (*Ward's*)	118,062[1]	85,440	66,648
TRADE			
Freight Carloadings (1000 cars)	595[1]	592	577
Intercity Truck Tonnage (changes from year ago)	+4.6%	+3.7%	−2.9%
Business Failures (Dun & Bradstreet)	352	366	315
Currency in Circulation (millions)[2]	$32,474	$32,594	$31,980
Dept. Store Sales (changes from year ago)[2]	+6%	+2%	+4%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$24,910	$26,797	$23,635
Federal Gross Debt (billions)	$293.2	$292.4	$288.6
Bond Volume, NYSE (millions)	$27.5	$25.6	$20.0
Stocks Sales, NYSE (thousands of shares)	15,164	17,222	14,495
Loans & Investments (billions, adjusted)[3]	$114.2	$114.6	$104.4
U. S. Govt. Obligations Held (billions)[3]	$33.3	$33.3	$27.2
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	230.8	227.2	230.3
All Commodities[6]	118.9[1]	118.9	119.3
Commodities Other than Farm & Foods[6]	127.4[1]	127.4	128.4

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

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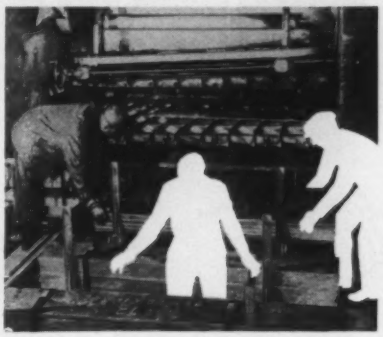

1 man does the work of 3!

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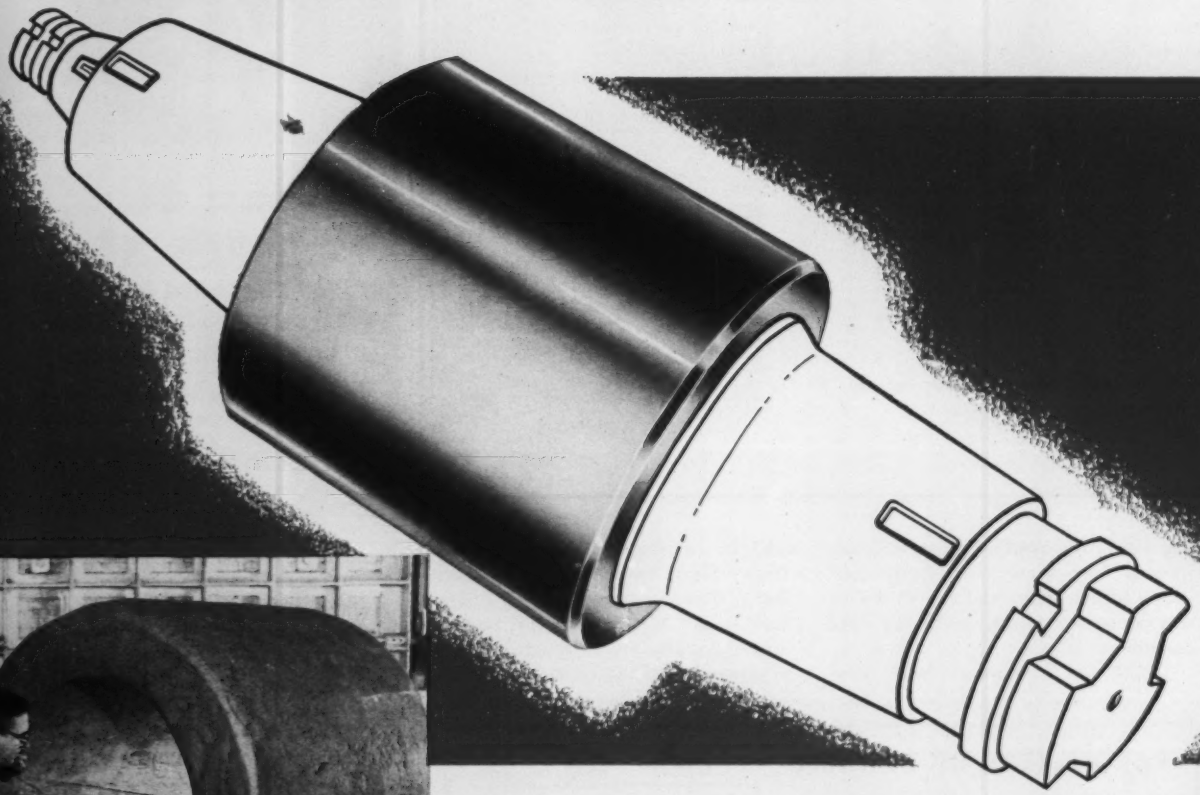

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LIMA, OHIO

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Flintuff Rolls
Double-Pour Rolls
Chilled Iron Rolls
Nioloy Rolls
Denso Iron Rolls
Nickel Grain Rolls
Special Iron Rolls
Forged Steel Rolls

PLANTS AT LIMA AND SPRINGFIELD, OHIO. *. Virtually at the center of the Steel Industry*

OR-52

HOYT C. PEASE
new post at Stanley Wks.

AUGUSTUS D. LAGOMARSINO
Alan Wood Steel p. a.

THAYER M. COWMAN
Columbus Bolt sales dir.

NORMAN BLOCK
Western Precipitation post

Hoyt C. Pease fills the new post of vice president - manufacturing at **Stanley Works**, New Britain, Conn. He has been vice president of Stanley Works, and general manager of Stanley Tools.

Augustus D. Lagomarsino was made purchasing agent, **Alan Wood Steel Co.**, Conshohocken, Pa.

R. F. Tallini was made manager-sheet metal; **Earl D. Rupert** manager-machining operations at the Columbus, Ohio, plant of **Janitrol Aero Div.**, Midland-Ross Corp.

Raymond C. Howell was made chief works engineer, Transportation Equipment Div., Chicago, **American Steel Foundries. J. Herbert Lund** was named manager-railway sales, Hammond Div.

Philip S. Hill was named president of **Hyster Co.**, Portland, Oreg. He succeeds **Earnest G. Swigert**, appointed chairman and chief executive officer. **Harvey N. Black** was named senior vice president.

Thayer M. Cowman was made director of sales, **Columbus Bolt & Forging Co.**, Columbus, Ohio. He succeeds **Jack L. Hindes**, who becomes director of manufacturing Jan. 1. **Donald J. Clark** was made manager of Detroit sales.

Harold E. Martin was named chairman and chief executive officer of **Metal & Thermit Corp.**, New York. Replacing him as president is **Charles J. Beasley**, former vice president and secretary. **H. W. Buchanan**, a vice president, was named executive vice president.

William A. Russell was appointed vice president-marketing for **Miniature Precision Bearings Inc.**, Keene, N. H. He was field sales manager at Norton Co.

John H. Hippensteel was made vice president and general manager of **Valk Mfg. Co.'s** Pell City, Ala., plant. He has been with Valk Mfg. since 1951 at its Carlisle, Pa., plant. He was assistant to the president.

Norman Block was made director of engineering and research for **Western Precipitation Div.**, Los Angeles, Joy Mfg. Co. He was director of quality control at Foster Wheeler Corp.

Howard G. Nyberg was named director of corporate planning, **Illinois Tool Works**, Chicago. He was assistant to the vice president-corporate planning at Bell & Howell Co.

Harold Nutt was elected chairman and chief executive officer, **Borg & Beck Div.**, Chicago, Borg-Warner Corp. President and general manager since 1955, he is succeeded by **James F. Bere.**

Thomas C. Ballou, former New York district sales manager, **American Car & Foundry Div.**, ACF Industries Inc., was appointed manager of railway equipment sales.

William J. Sipple was made works manager, **American Hollow Boring Co.**, Erie, Pa. He was superin-

PHILIP S. HILL
Hyster president

WILLIAM A. RUSSELL
MPB marketing v. p.

JOHN H. HIPPENSTEEL
Valk plant v. p.

WILLIAM J. SIPPLE
joins Amer. Hollow Boring

CHARLES E. CLARK

J. LEONARD HOUGH

Republic Steel district positions

JOHN POWERS

HENRY De MATTEO

Verson Allsteel Press executives

tendent of the machine shop of Erie Forge & Steel Corp.

Charles E. Clark was made superintendent; **Elwood J. Bowman** assistant superintendent of the 98 in. cold strip mill at the Cleveland District plant of **Republic Steel Corp.** Mr. Clark succeeds **H. H. Chapin,** transferred to the Southern District plant in Gadsden, Ala. **J. Leonard Hough** was named chief engineer, Central Alloy Steel District (Canton and Massillon, Ohio), to succeed **E. W. Phillips** who continues in that capacity until retirement in January.

Joseph M. Hinchey was made general sales manager, Electro Dynamic Div., **General Dynamics Corp.,** Bayonne, N. J.

William H. Schiek was made sales manager, Switchgear Div., **Moloney Electric Co.,** St. Louis.

Carl B. Smith was made general manager; **Frank Spaniel** general superintendent, **Penco Div.,** Oaks, Pa., Alan Wood Steel Co.

John W. McReynolds was made manager, industrial truck sales; and **Edwin F. Neuman** manager of service for **Automatic Transportation Co.,** Chicago, division of Yale & Towne Mfg. Co.

W. M. Kelly was made manager-technical operations for **Union Carbide Metals Co.,** New York, division of Union Carbide Corp.

T. J. Simendinger was named hoisting equipment product sales manager, **Yale Materials Handling Div.,** Philadelphia, Yale & Towne Mfg. Co.

John Powers was named vice president-operations, **Verson Allsteel Press Co.,** Chicago. **Henry De Matteo** was made manufacturing and works manager.

S. V. O'Brien, formerly with the Special Products Div., Singer Mfg. Co., joined **Diehl Mfg. Co.,** Somerville, N. J., as manager of material control.

W. F. Hoffman was made manager-industrial sales, **Pittsburgh - Des Moines Steel Co.,** Pittsburgh.

James D. Smart was promoted to power steering sales supervisor, Mobile Hydraulics Div., **Vickers Inc.,** Detroit, division of Sperry Rand Corp.

Alfred H. Roth, formerly in charge of advertising and sales promotion at **Towmotor Corp.,** Cleveland, was promoted to manager of marketing and advertising. **Daniel M. Wessman,** assistant sales manager, was promoted to the new post of assistant to the executive vice president. **W. L. Utley** was made assistant to the president, in addition to his position as assistant secretary.

Robert B. Kirkwood joined the Sales Dept. of **Ederer Engineering Co.,** Seattle. He heads sales for the Light Overhead Crane Dept., and will assist in expanding heavy industrial crane sales.

Herbert W. Fichtner was made national sales manager, **Permattach Diamond Tool Corp.,** Milford, N. H., subsidiary of Hitchiner Mfg. Co. Inc.

Howard W. Hill, former treasurer, was named executive vice president, **Zero Mfg. Co.,** Burbank, Calif.

Curtis D. Hoffman was named general sales manager, **Jessop Steel Co. of California,** Santa Fe Springs, Calif. He joined the firm last May to head its newly created Aluminum Div.

Lloyd C. Morrow succeeds **John J. Schnabel,** resigned, as manager of purchases, **Fairmont Railway Motors Inc.,** Fairmont, Minn. **Theodore A.**

ALFRED H. ROTH

DANIEL M. WESSMAN

W. L. UTLEY

promotions at Towmotor Corp.

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DR. WILLARD E. MATHESON
joins Acoustica Associates

G. L. WERLY JR.
Air Reduction Sales post

THOMAS C. BROWN
Gould-National div. sales

J. E. LeMAY
National Carbon marketing

KENNETH R. DANIEL
Amer. Cast Iron Pipe exec.

THOMAS E. MURPHY
Carpenter tool steel sales

J. J. DAVIS
Esco president

DONALD S. MYERS
Amsler Morton v. p.

T. D. LYONS
A-C group adm. v. p.

Fancher was made assistant manager-purchases.

J. J. Davis was elected president, **Esco Corp.**, Portland, Oreg., succeeding **Newman Ward**, now chairman. **C. F. Swigert Jr.** becomes honorary chairman.

David F. Hansen was appointed sales manager of **Howard Industries Inc.**, Racine, Wis.

Donald S. Myers was named vice president of **Amsler Morton Co.**, Pittsburgh, subsidiary of Textron Inc. He is in charge of furnace sales to the steel industry. He was with Surface Combustion Co.

T. D. Lyons, comptroller of **Allis-Chalmers Mfg. Co.**, Milwaukee, was elected vice president-administration, Industries Group. **W. S. Pierson** was elected comptroller.

Dr. Willard E. Matheson joined **Acoustica Associates Inc.**, Los Angeles, as director of engineering for its Advanced Systems Div. He was director of nuclear space programs for Douglas Aircraft Corp.

G. L. Werly Jr. was made general marketing manager, **Air Reduction Sales Co.**, New York, division of Air Reduction Co. Inc.

Thomas C. Brown was made general sales manager of the newly formed Engine Parts Div. of **Gould-National Batteries Inc.**, St. Paul, comprised of Wilkening Mfg. Co., White Machine Works, Arrow Head Steel Products, and Gillett & Eaton. Mr. Brown succeeds **F. H. Harris**, former vice president of the division, who resigned. **H. C. Foster** succeeds Mr. Brown as replacement sales manager for the division.

J. E. LeMay was made carbon products marketing manager of **National Carbon Co.**, New York, division of Union Carbide Corp. He succeeds **W. C. McCosh**, recently named director of marketing.

Kenneth R. Daniel was elected executive vice president, **American Cast Iron Pipe Co.**, Birmingham. He was vice president-engineering and purchases.

Thomas E. Murphy was promoted from assistant manager to manager of tool steel sales by **Carpenter Steel Co.**, Reading, Pa.

OBITUARIES...

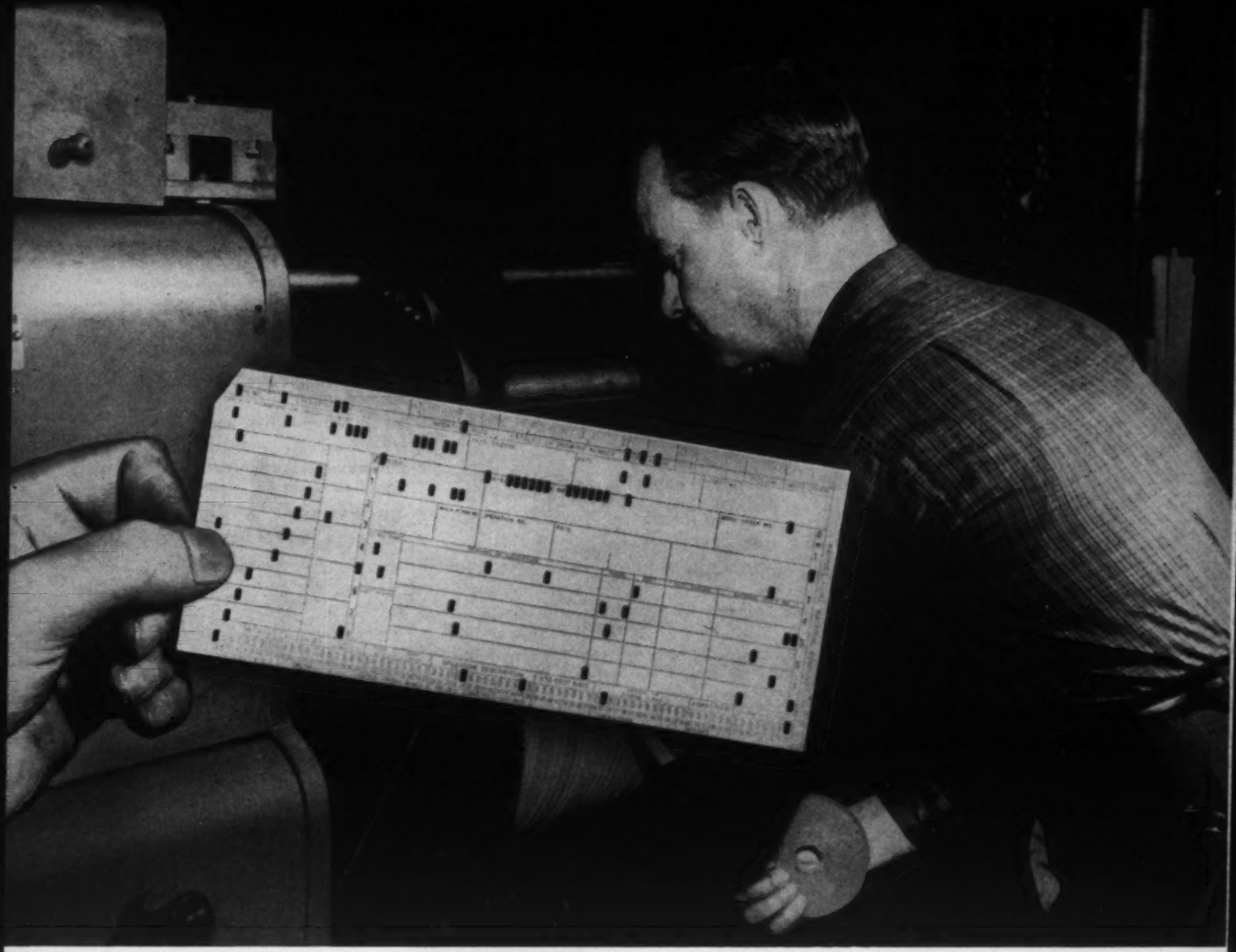
Charles C. Gates, 83, president, **Gates Rubber Co.**, Denver, died Aug. 29.

Ferdinand W. Dohring, 62, vice president and general sales manager, **Elliott Co.**, Jeannette, Pa., until retirement in July, died Aug. 25.

Albert H. Tinnerman, 82, founder and chairman, **Tinnerman Products Inc.**, Cleveland, died Sept. 4.

Robert E. Gross, 64, chairman, **Lockheed Aircraft Corp.**, Burbank, Calif., died Sept. 3.

William L. Garner, 72, sales engineer for **Exomet Inc.**, Conneaut, Ohio, died Aug. 28.



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ELPAR

Metalworkers Urged to Increase Foreign Investments and Trade

FOREIGN investments and trade should be regarded as an opportunity for survival and profit, maintains D. A. Mitchell, director of commercial market and product planning for Raytheon Co., Lexington, Mass.

He admonishes U. S. manufacturers to look beyond old protective tariffs and antique export policies. He urges them to "think worldwide."

"Foreign trade can no longer consist of manufacturing products in the U. S. and . . . simply selling (them) abroad," he insists. U. S. companies will find it increasingly difficult to compete with other nations in domestic and foreign markets.

• **Opportunities** — The developing nationals of the world are building efficient factories and want to build more to supply the products their people need, he points out. There are vast opportunities to unite with them and help build, produce, and sell and share in their profits.

He urges businessmen to accept less than a dominating position. One U. S. manufacturer has more than 25 joint corporations overseas. In each case, its ownership is 50 per cent or less. All are operating profitably.

Small firms abroad are combining, and the groups can challenge many of our largest corporations, he says. In France alone, 9000 firms have participated in mergers. They have become major factors in their fields during the last three years.

U. S. firms can join in such ventures. Their "knowhow and can-do," product designs, and patents often qualify for partnerships with little or no capital outlay. "Although U. S.-made products may no longer be able to compete on the basis of price in world markets, our designs and innovations will continue to make us attractive partners to firms in other nations," he adds.

Many U. S. manufacturers are turning to Latin America, Africa, and Asia to replace lost sales in Europe. And, he warns, those markets will diminish as manufacturing capabilities are developed in those areas.

Here are some recently announced ventures:

• **Crane Co.**—This firm is extending its international manufacturing facilities to the Far East and has established a manufacturing subsidiary, Crane Australia, in St. Marys (Sydney), New South Wales. The plant will produce valves, water meters, and pumps.

• **Electric Autolite Co.**—Additional manufacturing facilities are being built in Venezuela for the production of automotive regulators, horns, armatures, and other electrical automotive equipment. The plant will also produce industrial batteries. The firm, Corporacion Venezolana de Acumuladores S. A., has been producing sparkplugs and automotive batteries.

Electric Autolite, Productos Para Industrias, and a group of Mexican investors have organized a firm, Industria Electrica Automotriz S. A., Mexico City, Mexico, to manufacture automotive electrical equipment.

• **Clevite Corp.** — This Cleveland firm plans to manufacture automotive bearings in Mexico and to offer 55 per cent interest in its subsidiary, Clevite de Mexico S. A. de C. V., to Mexican investors. Percy Babb, general manager of Clevite de Mexico, will continue in that capacity in the new organization.

• **Macton Machinery Co. Inc.**—This Stamford, Conn., firm and Officine Meccaniche di Savona, Servettaz-Basevi, Genoa, Italy, have entered into an agreement. The Italian firm is licensed to manufacture and market Macton turntables in Italy, Greece, Switzerland, Turkey, and Yugoslavia. Similar agreements are expected to be made with firms in the European Common Market and in other Western European countries.

• **Bay State Abrasive Products Co.**—This Westboro, Mass., firm has selected the Duchy of Luxembourg as the site of its third manufacturing subsidiary. A plant will be built in the Commune of Steinsel. Production is scheduled to start within nine months.

• **Steel Improvement & Forge Co.**—This Cleveland firm has licensed Birmingham Small Arms Co. Ltd., Birmingham, England, through its subsidiary, B.S.A. Tools Ltd., to build and market its electrochemical metalworking machines in a score of foreign countries. Steel Improvement has a similar contract with Ex-Cell-O Corp., Detroit, for building and marketing the machines in the U. S., Canada, West Germany, Austria, Switzerland, Holland, and Japan.

• **Hills-McCanna Co.**—A Canadian subsidiary of this Carpentersville, Ill., firm will manufacture ball valves, diaphragm valves, and chemical proportioning pumps. Headquarters of Hills-McCanna (Canada) Ltd. are at 1920 Mattawa Ave., Summerville (Toronto), Ont. T. A. B. Clements is general manager.

• **National Lead Co.**—The firm is operating its new diecasting plant at Boulogne, Argentina, through its subsidiary, Doehler Argentina S.A. The plant has facilities for diecasting aluminum, zinc, magnesium, and brass. Electroplating equipment is available for finishing the diecastings with nickel and chrome.

Firms Change Designations

A. O. Smith Corp., Milwaukee, changed the name of its Smith-Erie Div., Erie, Pa., to Meter & Service Station Equipment Div. P. D. McManus is general manager of the division. A new plating department is part of a 110,000 sq ft addition of manufacturing area which nearly doubles facilities.

Narda Ultrasonics Corp., Syosset, N. Y., changed its name to Dynasonics Corp. as part of a change

(*Please turn to Page* 88)

An automatic coiler forms .063 Johnson tinned music spring wire into an automobile brake cylinder spring. Because this spring will spend its life in a bath of corrosive brake fluid it needs a heavy, uniform tin plating that will not peel, crack or flake. It is a critical spring with 12½ coils, held to tight tolerances and coiled with two different end sizes. The larger end is 1.034 inches while the smaller end is .710 inch.

Mid-Continent Spring Company of Ky. says . . .

Dependable Johnson Music Spring Wire Gives Precision Springs Reliability

Dependable quality and quick service are two major reasons Johnson wire is specified in Kentucky spring plant

"After 23 years in the spring manufacturing business, I'll give you my one-word description of Johnson Steel & Wire Company's spring wire . . .

"It's DEPENDABLE."

So says L. B. Langhi, president of Mid-Continent Spring Company of Ky.

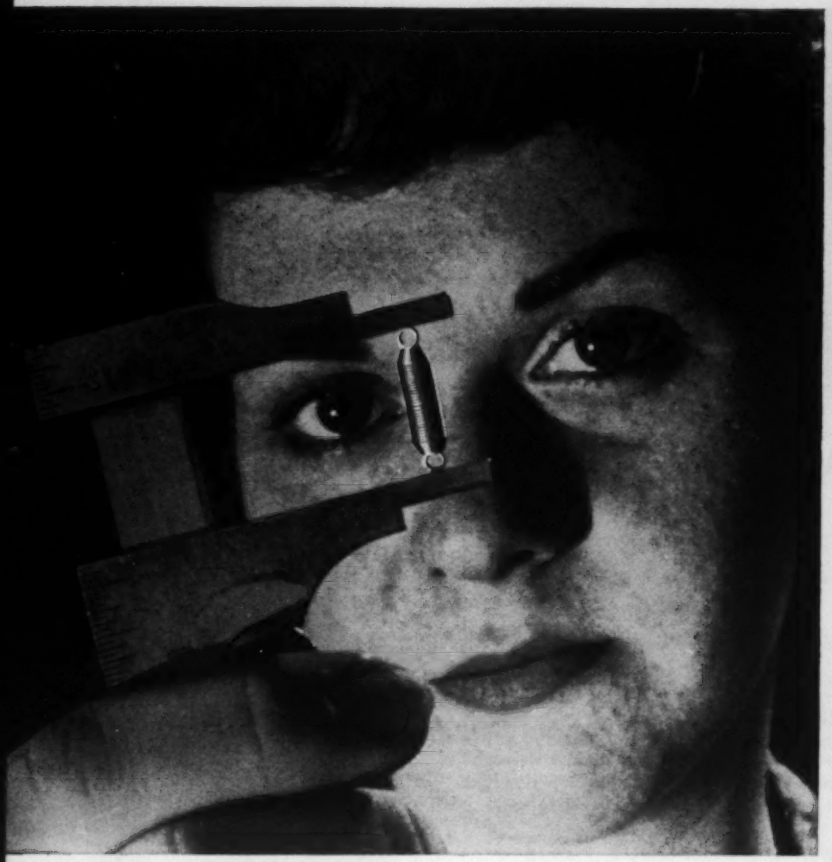
And that goes for Johnson's high carbon wire destined for springs that snap into action at the critical moment of a missile launching or simply make a baby doll wink, as Mr. Langhi explains.

Regardless of their job, it's vitally important to Mid-Continent's customers that springs function with precision. So the firm's plant at Hopkinsville, Ky., builds reliability into all its products, whether for space flights, toys, automotive and electrical parts or vending machines.

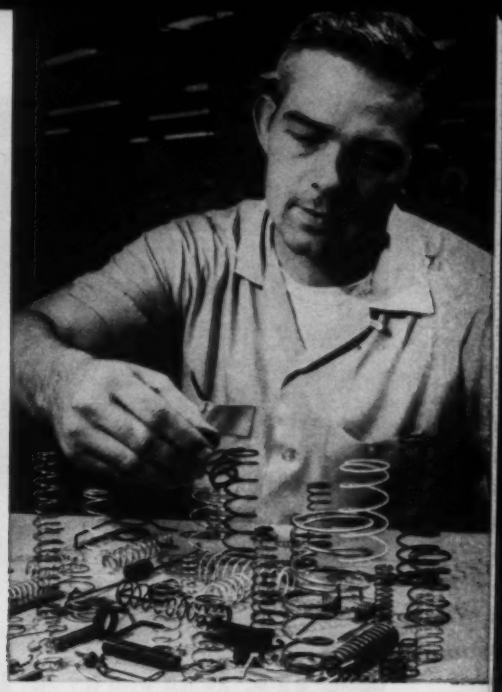
This reliability depends as much upon the raw materials of the springs —music spring wire or oil tempered spring wire—as it does upon the skills of Mid-Continent's spring makers.

Mr. Langhi said: "Because our customers depend upon our springs to give them a full measure of value, we demand and get wire from Johnson that has a uniform quality in finish, temper, size and physical properties.

"Coatings on Johnson tin-coated



A carburetor control extension spring must be held to unvarying tolerances to insure consistent performance. This important spring is made of Johnson .010 tinned music spring wire, has an O.D. of .118 inch and measures ¾ inch outside the loops.



R. M. Worthman, purchasing agent for Mid-Continent Spring examines some of the one thousand different type springs manufactured at Mid-Continent.

This tiny vending machine extension spring is made of Johnson .013 tinned music spring wire, has .158 I.D. and 22 turns.

music spring wire are both uniform and adherent. This eliminates peeling, cracking or flaking during our coiling operation."

High physical properties, uniform cast and smooth surfaces are other important requirements since Mid-Continent springs must form within strict dimensions and carry precise work loads.

At Mid-Continent, accuracy of wire dimensions greatly affects spring coiling and performance. Close tolerances on dimensions are met consistently in fine wire specialties produced by Johnson Steel & Wire Company.

"Our production averages over a million springs per day," said R. M. Worthman, purchasing agent for Mid-Continent Spring.

"Because of this, we keep our warehouse stocked with at least 300 tons of wire. Johnson supplies us with a range of .008-inch to .207-inch music spring wire and oil tempered wire.

"Whenever our wire stock begins to deplete, we're able to call for and get fast delivery service from Johnson's mill in Worcester or from its warehouses in Chicago or Akron.

"Of the 64 different types of brake drum springs we manufacture, 90 percent of them are made of Johnson wire. That's what we think of Johnson Steel's wire."

Let Johnson start today to help you with your high carbon spring wire needs.

Just call the nearest district sales office and talk with a Johnson representative. He's ready to help you with whatever your wire and spring problems might be—right now.

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

a subsidiary of **Pittsburgh Steel Company**

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

Akron	Cleveland	Detroit	Los Angeles	Pittsburgh
Chicago	Dayton	Houston	New York	Tulsa
			Philadelphia	Warren, Ohio

Steel

Cut

REINFORCING RODS and

SOFT or HARD METALS

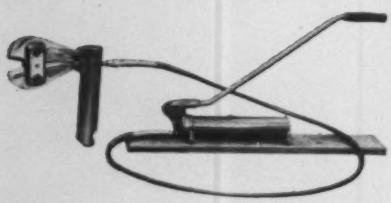
with HKP®

HYDRAULIC CUTTERS

HAND or POWER OPERATED

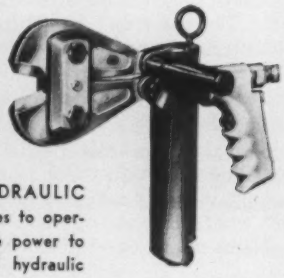
NOW — HKP ADDS HYDRAULIC POWER to its CUTTERS to give you FASTER, EASIER CUTTING!

HKP Hydraulic Cutters cut all soft or hard metals, concrete reinforcing rods, stainless steel, ⅝" cold rolled steel and ¾" hot rolled steel. Cutting blades are drop-forged and induction-hardened to give long, satisfactory cutter blade life. Ram is adjustable to compensate for wear on cutting blades.



HKP HAND-HYDRAULIC POWER — for everyday metal cutting jobs.
Fast-acting Hand-Hydraulic Pumps force hydraulic fluid through high pressure hose to the ram assembly to deliver 25,000 P.S.I. pressure to the cutting edges. By-pass valve, two filter screens plus magnet in the pump prevent damage from overloading and assures long, trouble-free service.

HKP POWER-HYDRAULIC POWER — for fast or multiple cutting
These are the same basic units as in the Hand-Hydraulic line, but are designed for use with the HKP Hydraulic Power Units. Convenient pistol grip and holding handle provide better cutting positioning and reduce fatigue. Positive-acting push button on pistol grip safely controls hydraulic cutting action.



THE POWER SOURCE
Portable, self-contained HKP HYDRAULIC POWER UNITS (many different types to operate up to 4 workheads) provide the power to operate any Porter power-operated hydraulic cutter.

Start now to save time, effort and money with these HKP Hydraulic-Power Rod Cutters. Call your HKP Representative today. He'll help you select the right combination of HKP Hand or Power-Operated Hydraulic Cutters to meet your specific requirements.
Other HKP Hydraulic Cutters for cutting soft and medium-hard coarse stranded guy wire, wire rope and cable through ¾" and up to 3" copper and aluminum communication and power cable (not ACSR), etc.
Contact your regular distributor or write for complete Porter Catalog.

HKP® **H. K. PORTER, INC.**
SOMERVILLE 43, MASS.

(*Concluded from Page 85*)

in management's policies toward research and product diversification in the field of electroacoustics.

Pollock Builds Big Metal Transfer Cars for Sharon

Contract to build four, 250 ton, hot metal transfer cars has been placed with William B. Pollock Co., Youngstown, by Sharon Steel Corp., Sharon, Pa. The cars, of the mixer type, are for Sharon's Farrell, Pa., works. They will transfer molten iron from the blast furnaces to the new Stora-Kaldo furnaces being constructed at that works.

Clevite Corp. Expands

Cleveland Graphite Bronze Div., Clevite Corp., Cleveland, is expanding and consolidating its warehouse facilities in that city. The program involves conversion of its general purpose building at the division's St. Clair Avenue headquarters plant and the addition of 45,000 sq ft of space to it. The new warehouse will contain 162,000 sq ft. Cost of the project: About $750,000.

Le Roi Div. Consolidates

Westinghouse Air Brake Co., Pittsburgh, is moving its Le Roi Div. operations from Cleveland to Sidney, Ohio, where they will be consolidated into the division's Sidney plant. The move will be completed by the spring of 1962. In January, 1960, Le Roi moved its manufacturing, sales, administrative, and engineering functions from West Allis, Wis., and Greenwich, Ohio, to Sidney.

Olin Brass Expanding

Olin has launched a multimillion dollar program to modernize its brass operations and raise production capacity. The program is scheduled to be completed in early 1964 and includes: Construction of a brass and copper casting and rolling plant in East Alton, Ill.; replacement and modernization of various finishing mills, annealing, slitting, and other facilities at the present Olin mills at East Alton and New Haven, Conn.; and modernization of brass fabricating facilities. Bids are being

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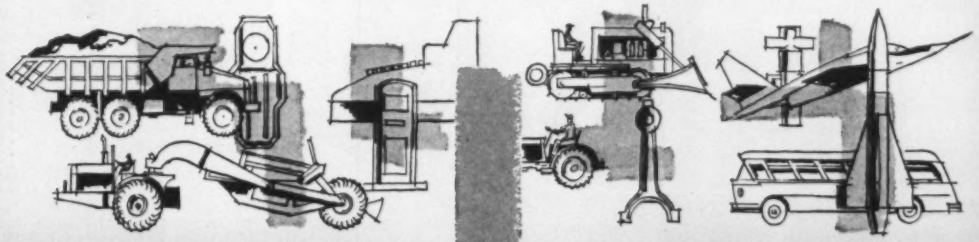
Cost and Quality Research

When your requirements involve forgings or deep drawn stampings,—and if you are faced with the problem of *reducing cost and improving quality* take advantage of Transue & Williams *Cost and Quality Research*. There are excellent possibilities that our experience gained from producing a variety of forgings and stampings for many industries can be a valuable aid in helping you solve your forging and stamping parts problem. *Write or call us today or send us a print to learn how we can be helpful.*

Finding better ways to reduce cost and improve quality through experience.

Sales Offices: Philadelphia • Old Saybrook (Connecticut) • Chicago • Detroit • Dallas • Los Angeles



in forgings

Sizes: 1 ounce to 500 pounds

Materials: Carbon and Alloy Steel, Non Ferrous and Stainless, Titanium, Pure Molybdenum, and High Temperature Alloys (Plain or Heat Treated)

IT'S BETTER FORGED

in stampings

Sizes: 3 inches by 3 inches, to 60 inches long, 40 inches wide and 16 inches in drawn depth.

Materials: Steel, Stainless and Aluminum. (Blanking, forming, welding, sub and final assemblies).

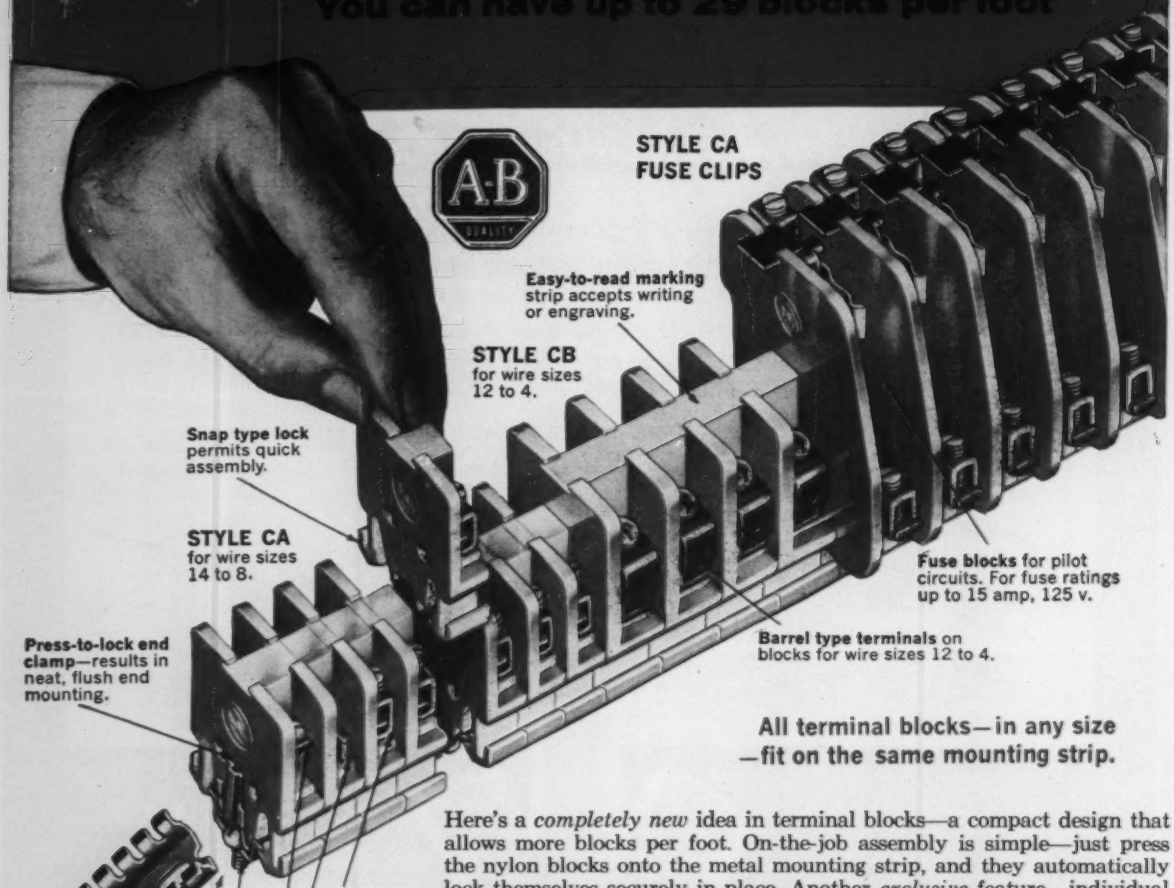
TRANSUE & WILLIAMS

ALLIANCE, OHIO

FORGINGS AND DEEP DRAWN STAMPINGS

New ALLEN-BRADLEY BULLETIN 1492 SNAP-ON TERMINAL BLOCKS *save space*

You can have up to 29 blocks per foot


STYLE CA
FUSE CLIPS
Easy-to-read marking strip accepts writing or engraving.
STYLE CB
for wire sizes 12 to 4.
Snap type lock permits quick assembly.
STYLE CA
for wire sizes 14 to 8.
Fuse blocks for pilot circuits. For fuse ratings up to 15 amp, 125 v.
Barrel type terminals on blocks for wire sizes 12 to 4.
Press-to-lock end clamp—results in neat, flush end mounting.
All terminal blocks—in any size —fit on the same mounting strip.
Barrel type
Stab type
Screw type
terminals available on blocks for wire sizes 14 to 8.
Mounting hole at each terminal block—no end anchors needed.
Scored mounting strip can easily be broken off —without tools—at any desired length.

Here's a *completely new* idea in terminal blocks—a compact design that allows more blocks per foot. On-the-job assembly is simple—just press the nylon blocks onto the metal mounting strip, and they automatically lock themselves securely in place. Another *exclusive* feature—individual units can be easily removed from anywhere in the strip . . . and replaced . . . without sliding all blocks off the end of the mounting strip. Plug-in end barriers are available for each block size. With mounting holes provided in the strip at each terminal block, a long assembly can be so securely fastened that there will be no "give" to the entire line.

Mounting strips for these new terminal blocks are furnished in six-foot lengths, which can be broken to any desired size. Each six-foot strip mounts 175 Style CA blocks, or 115 CB blocks, and is furnished in this length completely assembled. All components used in the assembly of these terminal blocks are available as individual units, sold in standard package quantities. Please write today for more complete information on these new "spacesaving" Bulletin 1492 terminal blocks.

ALLEN-BRADLEY

Member of NEMA

QUALITY MOTOR CONTROL

invited for the new equipment and installation services, says M. L. Herzog, vice president.

Weirton Contracts for 28 Bottom Pour Steel Ladles

Pennsylvania Engineering Corp., New Castle, Pa., has booked a contract for 28 bottom pour ladles from Weirton Steel Div. of National Steel Corp., Weirton, W. Va. It's one of the largest ladle contracts placed by a U. S. steelmaker in recent years. It covers 16 ladles of 280 tons capacity each, and 12 ladles of 230 tons capacity each. Design of the 12 smaller ladles is such they can be modified to accommodate 280 tons after they have been in service.

Another heavy equipment contract involves the leasing of 46 covered hopper railroad cars of a new design to Union Carbide Corp. by Transport Leasing Co., Chicago, a subsidiary of Pullman Inc. The new car, called Chem-O-Vac, was developed by the Pullman-Standard Div., Pullman Inc., and Union Carbide for pneumatic handling of bulk chemicals, such as polyethylene. The cars will be built at the Butler, Pa., plant of Pullman-Standard.

Aluminum Plant Planned

Bridgeport Brass Co. (a division of National Distillers & Chemical Corp). and Cerro Corp., New York, are studying the feasibility of constructing an aluminum reduction plant at Wauna, Oreg. The $50 million facility would have an annual capacity of 56,000 tons. The proposed plant would employ the conventional aluminum electrolytic reduction process and use prebaked carbon electrodes produced at the site.

Master Electric Moving

Master Electric Div., Dayton, Ohio, Reliance Electric & Engineering Co., will move its operations to a 210,000 sq ft plant in Columbus, Ind., and a 160,000 sq ft plant in Madison, Ind. The move will be completed by early in 1962. Headquarters for the division will be established in Columbus. The division produces fractional horsepower and specialty motors (Madison) and gearmotors (Columbus). The division's Dayton plant will remain in full production for at least three more months.

NEW ADDRESSES

Kerns United Corp. moved its executive, sales, and general offices to 824 State St., Calumet City, Ill. The firm's research and development laboratories and manufacturing plant remain at 2657 E. 95th St., Chicago, Ill.

American Can Co., New York, moved the main office of its **Bradley-Sun Div.** from Hillside, N. J., to U. S. Highway 22, Union, N. J.

F. J. Littell Machine Co. moved to 4101 N. Ravenswood Ave., Chicago 13, Ill.

Babcock & Wilcox Co., New York, moved two sales offices of its Tubular Products Div., Beaver Falls, Pa.: Packard Bldg., 15th and Chestnut Streets, Philadelphia, Pa.; 94 S. Los Robles Bldg., Pasadena, Calif.

Kaiser Aluminum & Chemical Sales Inc., Oakland, Calif., moved its Philadelphia district office to 2 Bryn Mawr Ave., Bryn Mawr, Pa.; its Boston district office to 235 Bear Hill Rd., Waltham, Mass. A. H. Woodward is district manager at Bryn Mawr; W. H. Grimm, at Waltham.

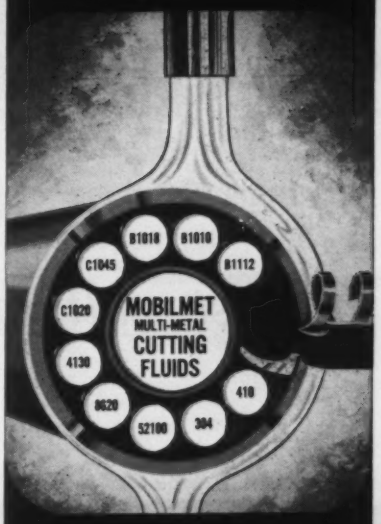
Light Metals Corp. moved its executive offices and production facilities to 2740 Prairie Ave., Wyoming (Grand Rapids), Mich. The company makes trim and hardware for the automotive, appliance, and vending equipment industries.

Industrial Finishes Co. Inc. will move Oct. 1 to 2 Bryn Mawr Ave., Bryn Mawr, Pa. Executive and sales offices and the Technical Service Dept. will be involved in the move; factory facilities will remain in Philadelphia.

James Electronics Inc. moved its Magnetic Div. to a new 12,000 sq ft building near the main plant on Chicago's northwest side.

(*Please turn to Page* 94)

SEE AD ON FOLLOWING PAGES...



For more information on Mobilmet cutting oils use this coupon

Mobil

Mobil Oil Company, Room 2058D
A Division of Socony Mobil Oil Co., Inc.
150 East 42nd Street, New York 17, N. Y.

Gentlemen: I am interested in learning how Mobilmet cutting oils can aid my operation.

NAME _____

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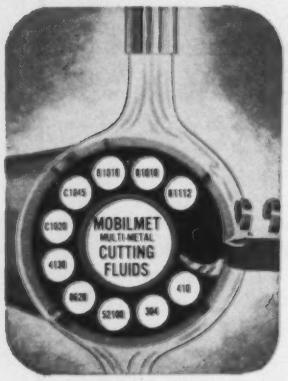
ZONE _____ STATE _____

NOW, PRESSURE-TEMPERATURE SELECTIVE CUTTING OILS THAT ADAPT TO YOUR MACHINING OPERATIONS

Mobilmet Oils

the first multi-metal cutting fluids



HERE'S HOW MOBILMET CUTTING OILS CAN SERVE YOU

Due to a unique additive combination, a single Mobilmet oil can be used on both soft, draggy metals and hard, brittle workpieces. As a result, there's less downtime for tool and cutting-oil changes. You get more production from each machine. And you save on handling costs, since you stock fewer oils. The wide range of Mobilmet applications includes: turning, drilling, boring, milling, gear hobbing, shaping and shaving, threading, tapping, pipe threading, surface and internal broaching, thread and form grinding, thread rolling, forming and special automatic screw machine operations.

In developing Mobilmet cutting fluids, Mobil research engineers made use of this Tapping Efficiency Tester to evaluate Mobilmet machining efficiency. In these tests and in field service on soft, draggy SAE1020 steel, new Mobilmet fluids out-performed cutting fluids designed specifically for this service.

Versatile new cutting oils offer you greater machine output, longer tool life, reduced loss from rejects, exceptionally wide range of applications! Now, after two years of exhaustive research and field testing . . . new Mobilmet* oils—the first multi-metal cutting fluids ever offered to the metalworking industry.

Mobilmet oils are uniquely versatile . . . help simplify your cutting oil requirements because each grade is effective over ranges of metals and operations beyond the capacity of any conventional product. And Mobilmet oils offer you superior machining results as well—in terms of improved finishes, longer tool life, and reduced staining.

Behind this versatility and effectiveness: a new additive combination, developed and patented by Mobil, which is pressure-temperature selective in its activity and—highly effective over wide ranges of cutting pressures and temperatures. For complete information, call your Mobil Representative or use coupon on preceding page.

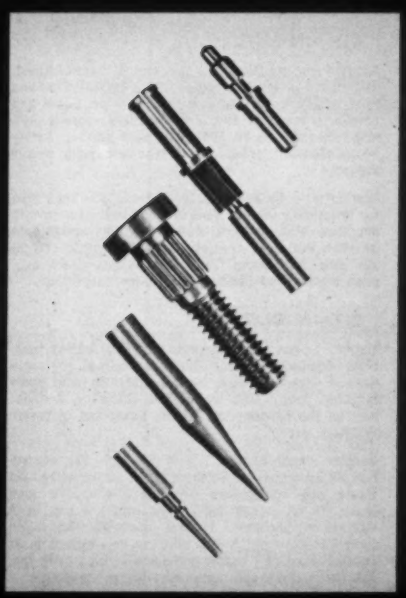
Mobil

*Mobilmet is a trademark of Socony Mobil Oil Company, Inc.

MOBIL OIL COMPANY, 150 East 42nd Street, New York 17, N. Y.

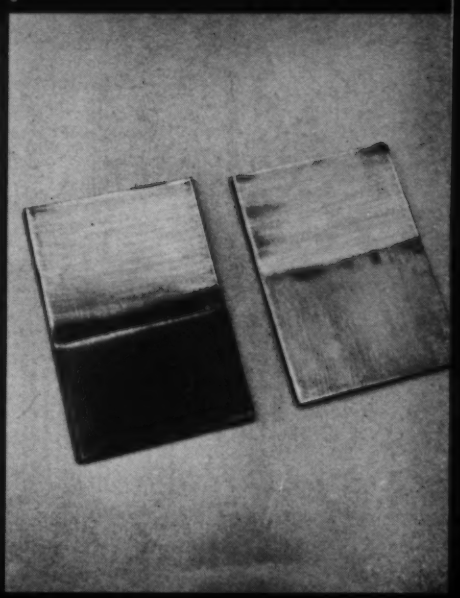
Longer tool life

Protected by heavy-duty Mobilmet, these pipe threading chasers, used for six weeks in moderately severe job-shop service, show little wear on either tool faces or thread crests. Mobilmet oils can mean longer tool life on soft or hard metals.



Fewer rejects

Because Mobilmet oils effectively control built-up edge and tool wear, you get superior finishes—fewer rejects. In some cases, Mobilmet oils reduce the need for additional finishing operations.



Less stain

New additive combination in Mobilmet oils inhibits staining effect. Plate on left was immersed in conventional corrosive cutting oil; plate on right was immersed in heavy-duty Mobilmet suitable for same application. Repolished tops of plates show original condition.

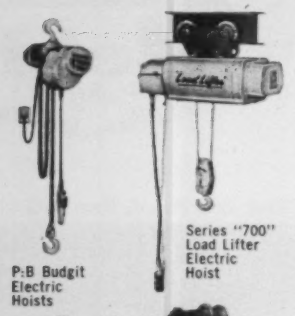
Lifting Made Easy

HOISTS AVAILABLE FOR EVERY LIFTING JOB

1✓ ELECTRIC HOISTS for frequent lifting with pace setting speed

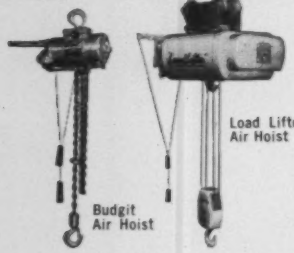
2✓ AIR HOISTS to lift fast where atmosphere conditions are hazardous, corrosive, extremely hot, dirty or wet

3✓ CHAIN BLOCKS for easy lifting where the work cycle is moderate



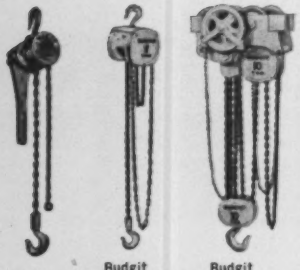
P:B Budgit Electric Hoists

Series "700" Load Lifter Electric Hoist



Budgit Air Hoist

Load Lifter Air Hoist



Tugit

Budgit Aluminum Chain Block

Budgit Army Type Chain Block

ELECTRIC HOISTS

P:B Budgit® Electric Hoists. 1/8 to 2 tons. Modern push-button hoists for regular service. Portable. Two fully enclosed automatic brakes. Spotting action is fast, accurate. 1/2-ton load can be lifted at 34 FPM. Hook suspension. Trolleys available. Standard models for intermittent service — AC, DC, and 12-volt battery types — have pull cord control.

Load Lifter® Electric Hoists. 1/2 to 15 tons. For heavy-duty and production line service. Safe 24-volts at the push button. Single and 2-speed control. A ton can be lifted at 60 FPM. Two automatic brakes. Types for lug or hook suspension; also with push, hand-geared or motor-driven trolley. Hi-hook model increases length of lift.

AIR HOISTS

Budgit® Air Hoists. 1/4, 1/2 and 1 ton. Compact, lightweight hoists for regular lifting service. Link and roller chain types. Explosion proof motor. Spark and corrosion resistant link chain models. Speeds infinitely variable to 75 FPM. Pull cord control. Safety hooks standard. Rigid mount type and push trolley available.

Load Lifter® Air Hoists. 1 to 15 tons. Wire rope type for heavy-duty service. Five cylinder motor for smooth operation at all speeds. Speed infinitely variable to 37 FPM. Pull cord control standard; throttle control available. Mechanical load brake adjusts itself. Lug, push trolley, and hand-geared trolley suspension.

CHAIN BLOCKS

Tugit® . . . the Lever-Operated Hoist. 3/4 to 3 tons. Light. Compact. Portable. Operates easily at any angle even in close quarters. Has countless uses in every industry. Spur-geared for highest efficiency. A 42-lb. pull on the handle lifts 2 tons. Spark and corrosion resistant models.

Budgit® Chain Blocks. 1/4 to 10 tons. For production or maintenance. Combine light, strong aluminum frame with spur-geared lifting and automatic load brake. 25 lb. pull on hand chain lifts 1/4 ton. Hook suspension standard. Trolleys available. Army-type Budgit has integral trolley that can be adjusted to fit several sizes of I-beams and permits high hook lift. Ask about spark and corrosion resistant models.

SOLVE YOUR LIFTING PROBLEMS. Call your nearby Shaw-Box Distributor for practical help in selecting the best type of overhead load handling equipment — hoist or crane — for each task. Or, write us for literature.

D

MAXWELL MANNING MOORE TRADE MARK

OVERHEAD LOAD HANDLING EQUIPMENT

Products of

MANNING, MAXWELL & MOORE, INC.

Shaw-Box Crane & Hoist Division • Muskegon, Michigan

In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario.

(*Concluded from Page 91*)

Vitro Chemical Co., a division of Vitro Corp. of America, New York, moved its Marketing Dept. to 261 Madison Ave., that city. The division makes uranium concentrates, rare-earth chemicals, pure metals, and special metal alloys.

DuBois Chemicals of Canada Ltd., a subsidiary of DuBois Chemicals Inc., Cincinnati, moved its general offices and manufacturing facilities to a new plant on Kenhar Drive and Weston Road, Weston (Toronto), Ont.

ASSOCIATIONS

American Iron & Steel Institute, New York, formed a Committee of Seamless Specialty Tubing Producers to promote and expand use of the product. Chairman of the committee is J. S. Anderson, Babcock & Wilcox Co., New York. E. J. Bolduc Jr. of the institute's staff has been named secretary. He also serves as secretary to the Committee of Tool Steel Producers.

Lewis E. Gage has been appointed to the market development staff of the **American Zinc Institute**, New York.

Among the 19 major engineering groups which will establish headquarters in the United Engineering Center, 345 E. 47th St., New York, N. Y., these have moved to the new location: **American Society of Mechanical Engineers; American Society of Civil Engineers; Engineers Joint Council**; and the **American Institute of Mining, Metallurgical & Petroleum Engineers Inc.**

Insect Wire Screening Bureau, New York, elected these officers: President, S. M. Jones, New York Wire Cloth Co., York, Pa.; and vice president, E. B. Frock, Hanover Wire Cloth Co., Hanover, Pa. P. M. Miranda is secretary.

Scale Manufacturers Association Inc., Washington, elected these officers: President, R. Y. Moss, Toledo Scale Corp., Toledo, Ohio; vice president, K. C. Allen, Hobart Mfg. Co., Troy, Ohio; and secretary, Arthur Sanders.

TURNKEY

The design and construction approach that can cut time and costs on your new plant—and KE is a master at it!

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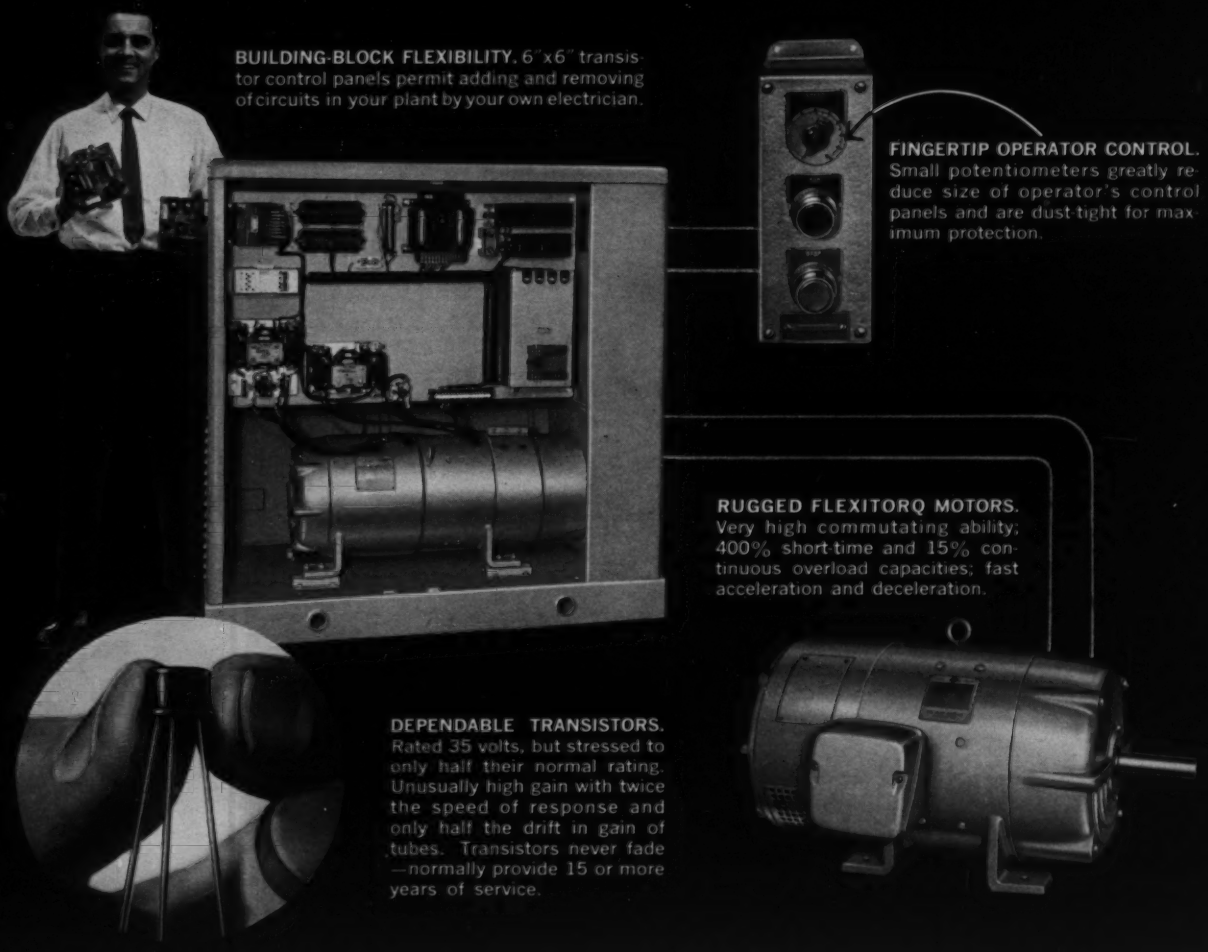
BUILDING-BLOCK FLEXIBILITY. 6"x6" transistor control panels permit adding and removing of circuits in your plant by your own electrician.
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RUGGED FLEXITORQ MOTORS. Very high commutating ability; 400% short-time and 15% continuous overload capacities; fast acceleration and deceleration.
DEPENDABLE TRANSISTORS. Rated 35 volts, but stressed to only half their normal rating. Unusually high gain with twice the speed of response and only half the drift in gain of tubes. Transistors never fade —normally provide 15 or more years of service.

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Here's a superior adjustable speed drive with simplified transistor-magnetic amplifier control. It's the easiest drive to set up and operate. A twist of the dial gives you stepless speed adjustment from zero to full speed in either direction. Each adjustment is independent, thus sparing you the need for compensating adjustments of inter-related settings. You get more consistent day to day operation because transistors — *unlike tubes* — are highly dependable.

The new Select-A-Spede defies obsolescence. To add functions you simply have your electrician install any of 13 "building-block" control circuits as your conditions require. These circuits come on inexpensive 6" x 6" panels ready for installation and are immediately available from Louis Allis stock. Thus a rebuilding or adaptation job that, on former equipment, cost thousands of dollars — excluding downtime — can now be done at a fraction of the cost and time *right in your own plant!* High quality transistors, field proven in missiles and other advanced electronic equipment, assure you of a high degree of dependability with a life expectancy of 15 or more years. Printed low-voltage transistor circuits are virtually trouble-free and can be quickly and easily replaced from low-cost stock.

Further savings are provided by the new Louis Allis Flexitorq® drive motors through vastly improved commutation, low brush wear, and their ability to safely withstand momentary overloads of 400% of normal horsepower rating.

Select-A-Spede sizes from 5 to 400 hp, speed ranges up to 20:1. Contact any one of the 60 Louis Allis District Offices for information and application assistance. Or write for bulletin 2001 to The Louis Allis Co., 471 E. Stewart Street, Milwaukee 1, Wisconsin.

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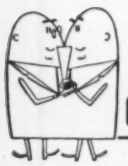

CONSOLIDATIONS

Miniature Precision Bearings Inc., Keene, N. H., acquired **Wafe Mfg. Co. Inc.**, Bridgeport, Conn., manufacturer of precision tools and dies. MHB will operate the property as its Wafe Div. under Vincent Wachter, general manager.

Goodyear Tire & Rubber Co., Akron, will acquire **Geneva Metal Wheel Co.**, Geneva, Ohio, subject to the approval of stockholders of the Geneva firm. H. A. Ford will be president of the Goodyear subsidiary.

Lindberg Steel Treating Co. Inc., Melrose Park, Ill., acquired **Lakeside Steel Improvement Co.**, Cleveland. J. H. Ries will continue as president of the subsidiary.

Stewart-Warner Corp., Chicago, acquired the **Aero Div.**, Minneapolis, Cornelius Co. Aero Div. operations will become part of those of Stewar Warner's South Wind Div., under the general management of A. R. Collins, vice president.

Bowman Products Co., Cleveland, acquired **Spirex Screw Co. Inc.**, Akron, distributor of fasteners, and will operate the property as a subsidiary. J. W. Carano continues as president.

Thermal Ceramics Industries Inc., Denver, purchased **Brazil Hollow Brick & Tile Co.**, Brazil, Ind., and has renamed the firm Denver Fire Clay Co. of Indiana Inc. The Indiana firm makes multiple channel and hollow tile pipe, industrial furnaces, incinerators, and kilns.

Alloys Unlimited Inc., Long Island City, N. Y., is acquiring **Bow Solder Products Co. Inc.**, Brooklyn, N. Y., and will operate it as a division under the name of Alloys Unlimited Solder Corp. Samuel Turkus Jr. will continue as president; Sam Osterman, vice president and plant manager.

Carpenter Steel Co., Reading, Pa., acquired **NTH Products Inc.**, El Cajon, Calif., and will operate it as a subsidiary. Officers of NTH include: President, E. W. Duff and vice presidents, Benjamin Salmon and Harry Wright. The California firm makes thin wall tubing.

Eastern Co. of Connecticut (formerly Eastern Malleable Iron Co.) acquired **Thompson Materials Corp.**, Belleville, N. J., supplier of specialty products to the highway and heavy building construction markets.

Cole Steel Equipment Co., York, Pa., and Toronto, Ont., is being acquired by **Litton Industries**, Beverly Hills, Calif. Cole markets office equipment and business machines.

NEW PLANTS

Fastener Corp. is building a manufacturing plant at 3702 River Rd., Franklin Park, Ill. The 172,800 sq ft plant will almost triple facilities for manufacturing staplers, tackers, nailers, and staples.

Arwood Corp., New York, will open its sixth investment casting plant at 3855 W. 150th St., Cleveland, Ohio. The plant should be in operation early in 1962. The fully integrated foundry will cast ferrous, cobalt, and nickel base alloys by the solid mold and ceramic shell processes.

NEW OFFICES

Granco Steel Products Co., St. Louis, opened a district sales office at 4265 Henderson Blvd., Tampa, Fla. R. J. Gindle is district manager.

Republic Steel Corp., Cleveland, established a district sales office at 1375 Peachtree St. N.E., Atlanta, Ga. J. A. Matthews is district manager. The office will also house sales people in Atlanta for Republic's Truscon, Berger, and Steel & Tubes Divisions, and for Vance Iron & Steel Co., a Republic subsidiary.

Anti-Corrosive Metal Products Co. Inc., Castleton-on-Hudson, N. Y., established a field office at 8230 Lehigh Ave., Morton Grove, Ill. Joe Shields is in charge of the office.

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. . . to Allegheny Stainless at work in the Food Service industry. See what Allegheny Stainless can do for you . . . for your customers.

Because stainless steel is synonymous with cleanliness, advertising such as appears on the next two pages works for you. It helps you to sell your products and services in an industry where cleanliness is a must. Check this ad which also appears in the current issues of CHAIN STORE AGE, FAST FOOD, INSTITUTIONS, as well as IRON AGE, and STEEL.

It's just another example of how Allegheny Stainless can work for you . . . in your products . . . in your markets . . . in your merchandising efforts.

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BEHIND EVERY

quality kitchen equipment of Stainless Steel

Back where the meals are prepared is where Stainless Steel shines.

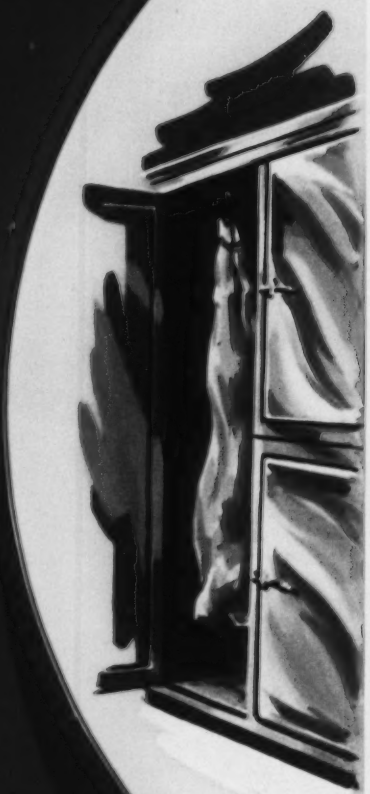
Because that's what stainless is made for.

Because it's smooth and dense, easy and efficient to work on . . . because it smiles right through the harshest kitchen acids and hottest greasy spills.

Because it's hard and tough to resist the scrape of heavy pots and pans, the clatter and batter of cutlery and utensils. And, because it's *stainless*, it can be cleaned . . . really cleaned . . . easier than any other metal. It's traditional in sanitation standards.

When you think about it, food service means stainless. When you know about it, stainless means Allegheny Ludlum.

The symbol of added value—look for it when you buy



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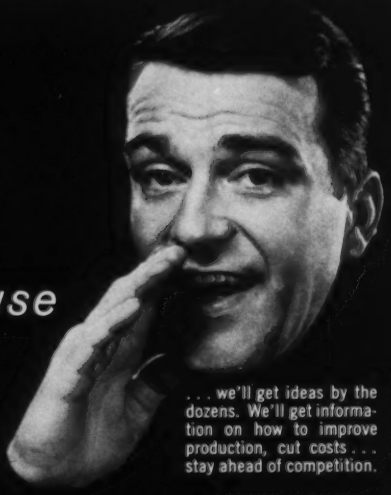
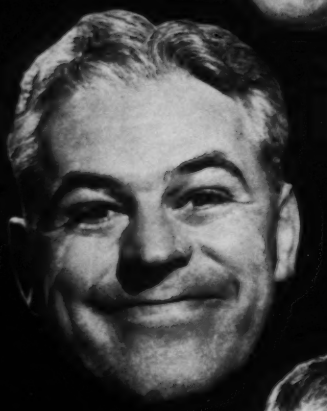


. . . we'll get ideas by the dozens. We'll get information on how to improve production, cut costs . . . stay ahead of competition.

. . . I want to study the new advancements in processing, inspection and control equipment. All under one roof at fabulous Cobo Hall.

. . . the spectacular Materials Applications Center will be one of the great "eye-popping", thought-stimulating exhibits of the year.



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. . . everyone will broaden and up-date their knowledge of the metalworking industry . . . more than 300 educational exhibits and more than 200 technical papers to SEE and HEAR.

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Technical Outlook

SEEK INTERMEDIATE ALLOY—Chromium is said to be a promising base metal for alloys which operate in the temperature range just above that of nickel-base alloys, but below that of tungsten, tantalum, molybdenum, and columbium. E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., says it will manufacture such alloys as soon as current research is completed. Rights for the development of an Australian system have been acquired.

BETTER POWER METALS—Participants at a power conference learned about a new alloy, IN-102, which can operate for long periods at 1200° F. Rupture strength is 2 to 2½ times that of current materials, it has excellent structural stability, and retains ductility over long periods, claims International Nickel Co. Inc., New York. The alloy has a chrome-nickel base and contains columbium, molybdenum, and tungsten. Absence of cobalt permits its use in nuclear reactors.

BETTER METAL POWDERS—A better nozzle improves the atomization of prealloyed molten metal, producing powders with lower surface oxides, better green strength, higher quality, and more desirable shapes for molding purposes than those currently available. The invention works equally well on large or small production lots, states the developer, Vanadium-Alloys Steel Co., Latrobe, Pa.

NO FUZZ, NO BOTHER—The Tin Research Institute, Greenford, Middlesex, England, is trying to determine whether electrodeposits of tin-nickel prevent whisker growth on metal surfaces. It has already checked two year old coatings of tin-nickel. Tests are continuing until whiskers do appear.

AN A FOR DEPORTMENT—A report made at the general meeting of the American Institute of Electrical Engineers at Salt Lake City, Utah, is expected to lend encouragement to those who may have hesitated for safety reasons to get into the nuclear energy field. Said W. I. Collett and E. R. Owen (General Electric Co.) of San Jose, Calif.: "Extensive tests have clearly established the smooth, stable, predictable, and responsive behavior of the 185 megawatt Dresden Power Station, near Chicago."

THE FUTURE IN PIPE—New technology promises pipelines that will carry an ever increasing variety of materials—from gases to delicate solids like strawberries. Other advances: The Russians are reported to have a system of shipping steel pipes flat, inflating them on site; epoxy coated pipes increase flow (or cut power requirements) from 5 to 10 per cent, states Arthur D. Little Inc., Cambridge, Mass.

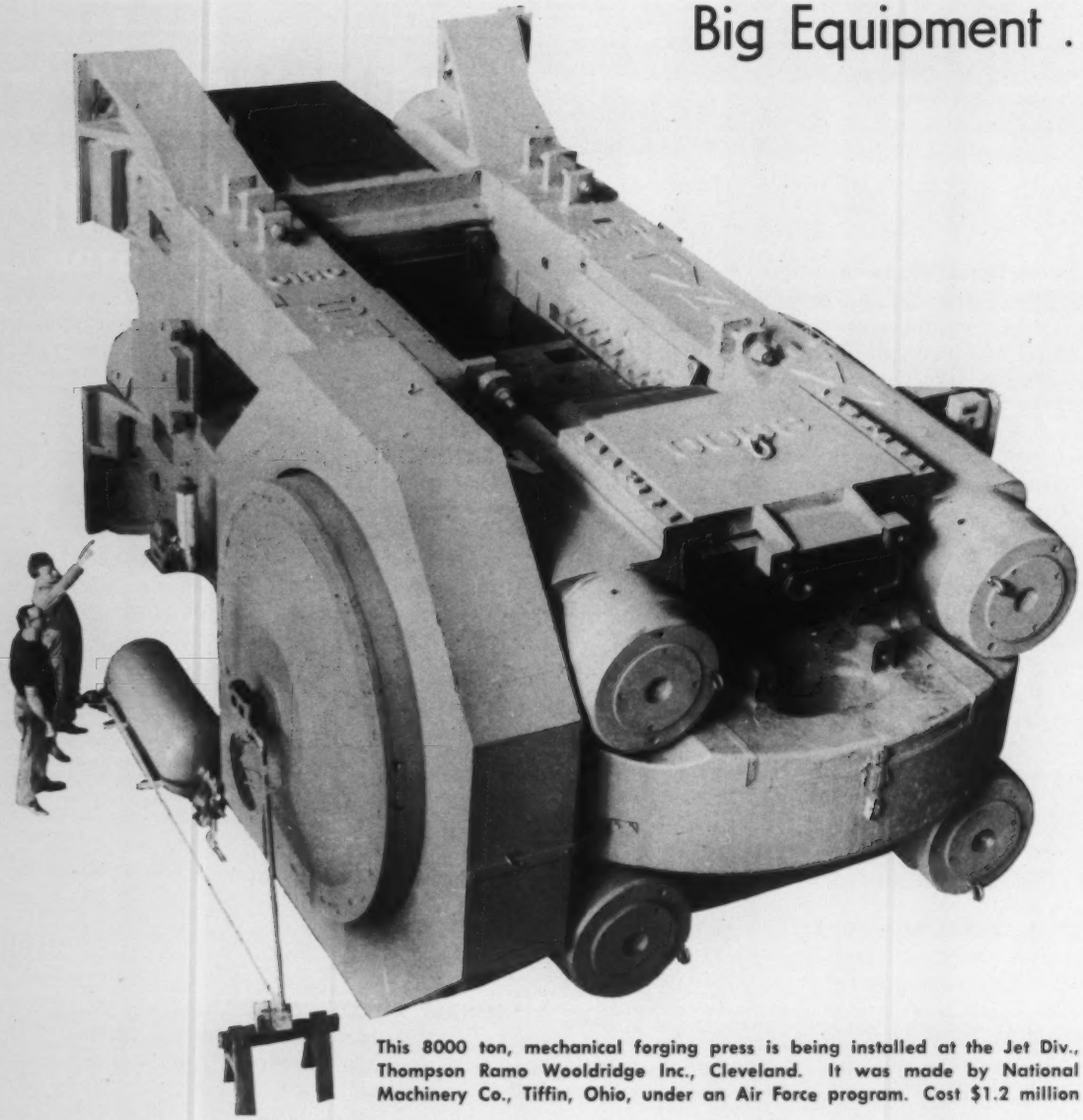
FATIGUE STRENGTH CUT—The Russians claim that metallic coatings (spray, dip, or electrolytic) on chrome tool steels substantially lower fatigue strength. Shot peening or nitriding somewhat offsets that loss if applied prior to the coating. Details are available from AD-257,166, Division 17, Office of Technical Services, Department of Commerce, Washington ($1.10).

ALUMINUM POROSITY CUT—A new alloy and a diecasting process are said to alleviate the problem of porosity in aluminum alloy engines. The alloy is dense and contains copper and zinc, says Clinton Engines Corp., New York. Other advantages: It bonds itself to cast iron better than older alloys; it is a superior bearing metal.

COOL ALUMINUM—Experiments at Battelle Memorial Institute, Columbus, Ohio, indicate that aluminum alloys, welded and unwelded, get stronger as temperature decreases to minus 423° F. The work was sponsored by the Aluminum Association, New York.

SUN-POWERED RADIO—Japan's Hayakawa Electric Co. plans to market a portable, transistorized radio this fall which will be operated by solar batteries. An auxiliary, rechargeable power pack will permit nighttime operation. Cost: About $42.

Big Equipment . . . .



This 8000 ton, mechanical forging press is being installed at the Jet Div., Thompson Ramo Wooldridge Inc., Cleveland. It was made by National Machinery Co., Tiffin, Ohio, under an Air Force program. Cost $1.2 million

Forgers Extend Their Technology

• **FORGING technology is undergoing a renascence.**

A STEEL survey of the industry reveals these encouraging advances and potential benefits:

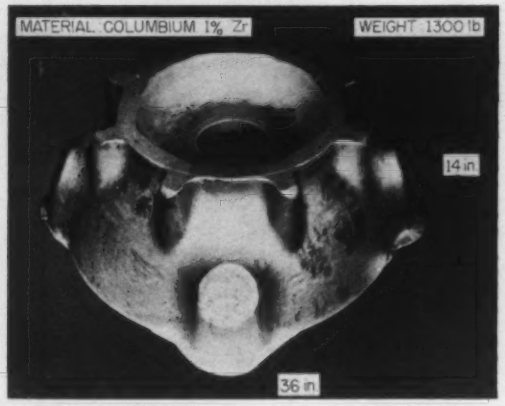
• Several firms say they can forge any Space Age metal or alloy.

• Despite some differences concerning industry standards, tolerances are getting closer—in some cases machining is eliminated. (The Drop Forging Association has compiled industry-wide standards—see facing page.)

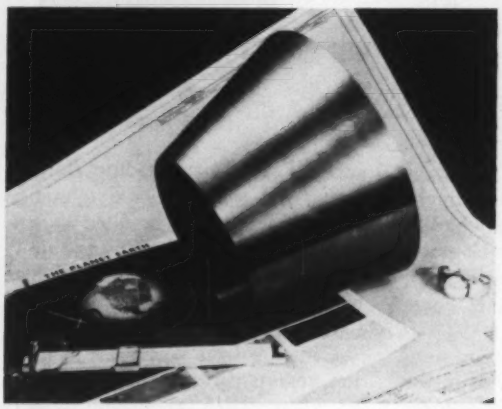
• Several firms report they are making forging designs more functional. Object: To cut customer costs.

• New, larger equipment is handling vastly bigger forgings. (Some firms report they're making forgings ten times larger than they did during World War II.)

• Cost cutting advances in auto-



Forgings this size—and larger—are being made regularly in superalloys, columbium (shown), and even tungsten. Much work is done with cast billets



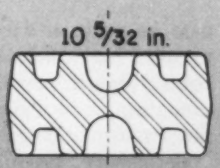
Cone shaped piece, 7 by 14 by 10 in., was forged from beryllium by Wyman-Gordon Co., Worcester, Mass. (Some say it's getting easier to handle)

Agreement Seen Near On Forging Tolerances

Standard forging tolerances for the U. S. and Canada aren't far from reality. Three years of exhaustive work was put in by member committees of the Drop Forge Association (Cleveland). It has been compiled and is in the final stages of approval. Last hurdles before publication: Acceptance by some of the smaller operators and nonassociation members.

Industry-wide agreement on what can be done will eliminate a broad area of misunderstanding between producers and customers. Better definitions will make cost formulas (thus prices) much easier to establish.

Here is an example taken from the material that will be published under the title, "Tolerances for Impression Die Forgings":



Computation—External Dimensions

		Plus	Minus
Outside diameter (converted to decimals)	10.156 in.		
Diameter times length-width tolerances	10.156 × 0.003	0.030	0.030
Diameter times die wear allowance	10.156 × 0.007	0.071	....
		0.101 in.	0.030 in.
Rounded off to 2 decimal places		0.10	0.03
Next higher fractional unit of measure		1/8 in.	1/32 in.

matic forging are an important factor in the current growth of production plants, mainly captive shops.

• Designers have an ever widening area of materials from which to choose.

Ladish Co., Cudahy, Wis., has forged nearly every type of forgeable metal known. "We believe we have the knowhow for any metal our customers might reasonably ask us to deliver," states T. L. Swansen, vice president, Custom Forge Div. "The only limitations are unusual combinations of size, geometry, and degree of precision."

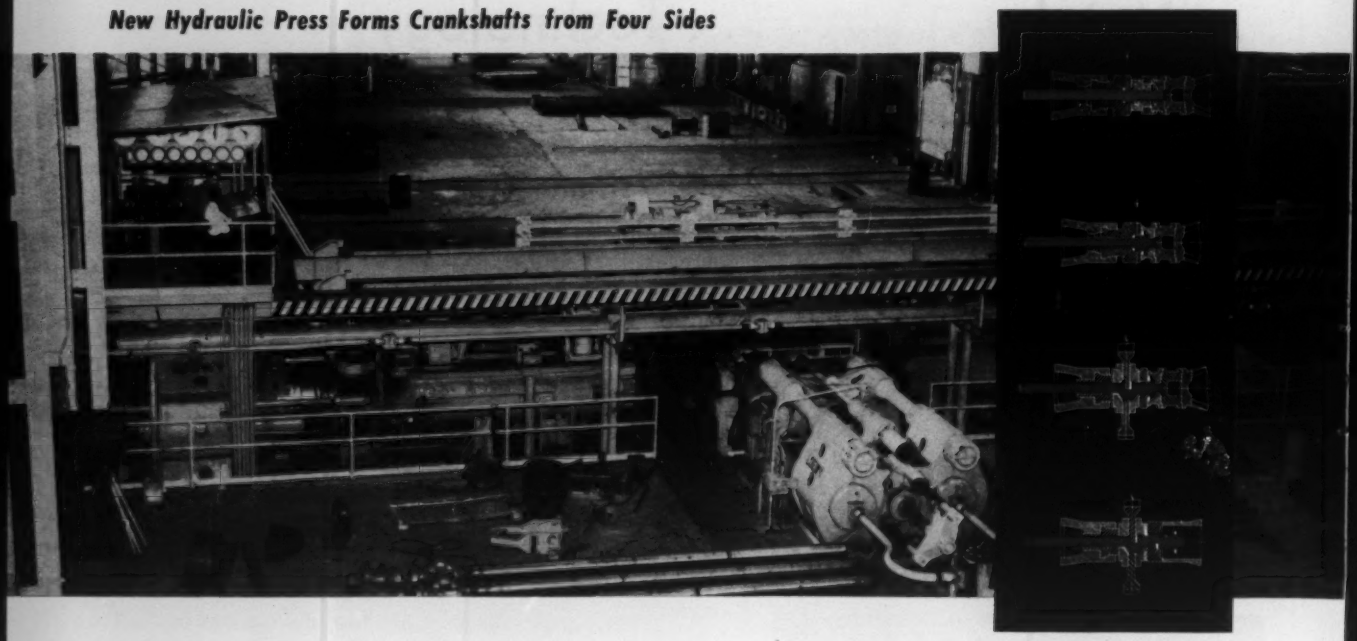
Ladish is turning out forgings in solid tungsten, tantalum, and beryllium with an unclad technique. Preforms of the beryllium are prepared by any one of several casting and sintering methods. "Physical properties in the worst direction of today's beryllium parts are now equal to or superior to those in the best direction of pieces made the old way," states Ladish.

Tungsten parts are being forged by a number of firms (see STEEL, Aug. 14, p. 142). Heating is one problem since temperatures must be in the 4000° F range. Says C. A. Furgason, vice president of research and metallurgy at Ladish: "Much work needs to be done. Our equations have four or five unknowns and it's a tedious process of introducing a change in one variable, running through the whole cycle and noting effects one at a time."

• A great deal of credit for improved forgings must be given to vacuum improved metals. Cleanliness has made larger parts possible —many couldn't have been produced with older metals.

A number of firms surveyed by STEEL note enough improvement in forgeability and physical properties to predict that a substantial part of all high performance forgings will

New Hydraulic Press Forms Crankshafts from Four Sides



soon be made of vacuum improved metals. Improvements are noted in stress rupture, tensile, and fatigue strengths (for nickel-base alloys) and the ductility of cobalt-base alloys.

Bethlehem Steel Co., Bethlehem, Pa., recently switched production of all its hardened steel rolls, rotors, shafts, and spindle forgings to vacuum improved metal at no increase in price. Implication: Improvements in forging response and machining, accompanied by diminishing rejects, offset higher raw material prices.

Similar benefits are readily available in other areas. A. Finkl & Sons Co., Chicago, employs vacuum metals in its die program. It also has furnished materials for advanced aircraft.

But requirements are hard to meet even with the improved steels. One customer for vacuum degassed steel insisted that heats be argon poured. Even so, only 1 out of 13 heats measured up to specifications. In another case cited by Finkl, 1 out of 6 forgings was sacrificed in destructive tests to insure five good ones.

• Military and space programs involving exotic materials and supercompositions often spawn side benefits for industrial users. "Many of our finest achievements might never have been attempted had it not been for such programs," states Fred Bronstrup, product design engineer, Steel Improvement & Forge Co., Cleveland.

For example, molybdenum forgings have led to better molds in the glass industry. Molybdenum stirrers and electrodes hold the heat better and don't contaminate glass. Also, the techniques forging people have passed on to fabricators of tungsten and tantalum have permitted them to roll foils and other thin shapes for electronic applications.

• Much attention is being given to tolerances. Ladish and Steel Improvement, working under a Boeing Co. (Seattle) Air Force contract, have shown that degree of accuracy depends greatly on shape. One of Boeing Co.'s conclusions: "100 per cent machining of forging surfaces . . . is not necessary."

Although much work remains to be done, the tolerance standards compiled by members of the Drop Forging Association, Cleveland (Page 103), appear to have a good chance of acceptance, say members polled by STEEL.

In working on exotic metals and superalloys, most leading forgers agree that a dimensional tolerance on a small, easily handled sphere could be kept within plus or minus 0.002 in. But more complex shapes make dimensional tolerances of 0.010 in. impossible.

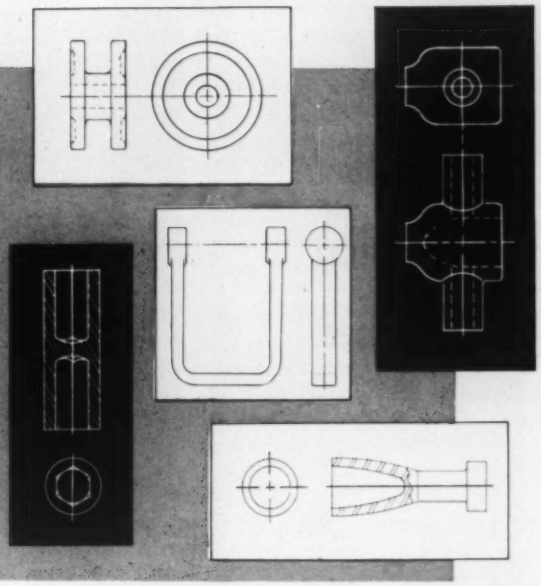
Cameron Iron Works Inc., Houston, reports it can regularly get plus or minus 0.015 in. Finkl reports its new forging press can hold thickness tolerances to 1/16 in.—enough for its purpose and considered close for open die work. An English firm makes digital controlled equipment that holds work to within 1/32 in. Another firm, Schloemann of Germany, makes digital control equipment that can do flatwork within 3/64 in.

Although many forging people are asking customers, "Why machine away close tolerances?" it is possible to eliminate a great deal of machining through close forging. Experts stress that such moves need planning since tight tolerances generally mean an increase in costs. (Some buyers try to justify requests for price cuts by saying that a close tolerance forging requires less metal.)

• Design continues to be an area rich in cost saving possibilities.

Press Shapes Odd Pieces, Cuts Die Costs

The Loewy multidirectional press at National Forge Co. can handle 29 ft bars, upset to 24 in. in diameter, offset an 11 in. bar 9 in. (less shrinkage). The firm can extrude a 30 in. billet from a 13 in. container, and pierce 4.5 to 8 in. (diameter) from 24 to 30 in. deep. Round bar stock is employed although square is sometimes needed to meet shape needs. Built primarily for crankshaft work, National says it is extending press operations in other directions.



Larger equipment opens the way to composite forgings, or making several at once.

Amforge Div., Chicago, American Brake Shoe Co., places great emphasis on putting metal only where it's needed. Hot piercing is an important technique, for future expansion, the firm says.

Example: A customer formerly required a 35 lb wheel-shaped piece with an elongated hub. Originally furnished solid, the new part is hollow, 11 lb lighter, and has stepdowns forged on the tapered hub surface. The customer realized a substantial saving in shipping costs alone (0.6 cent a pound).

Advantages of Amforge's piercing technique:

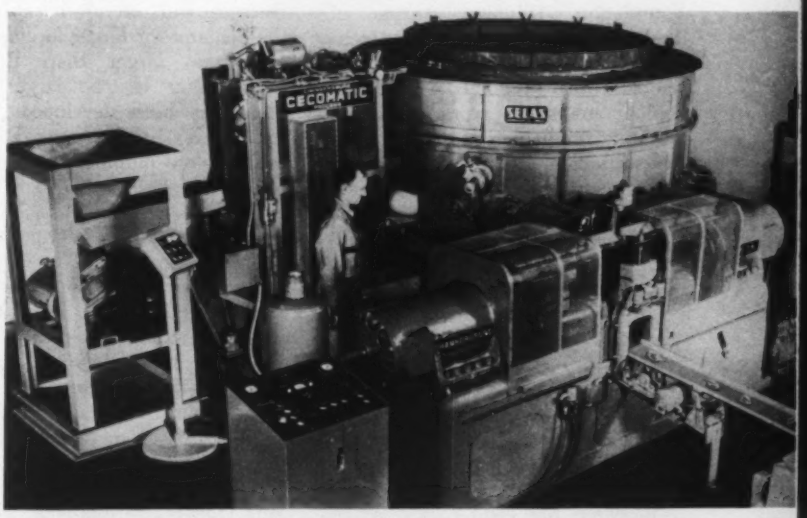
1. It saves metal.
2. Sometimes, no further machining is needed.
3. Some dimensions can be held close enough for finish broaching.
4. Tolerances of cylinders are said to be better than those of seamless tubing.
5. The technique greatly reduces die wash, cutting tooling expenses.

Amforge can pierce a little deeper than 20 in., "but it's really unlimited," says Alfred Walpole, the firm's consultant. Other data: Minimum hole is 7/8 in. in diameter; tolerances are plus or minus 0.020 in.

Rules suggested by the firm: You can save if the part requires drilling a solid piece; more, if your part requires no further finishing. "Avoid piercing if you have to drill anyway, since it's easier to drill a solid than bore a hole already forged."

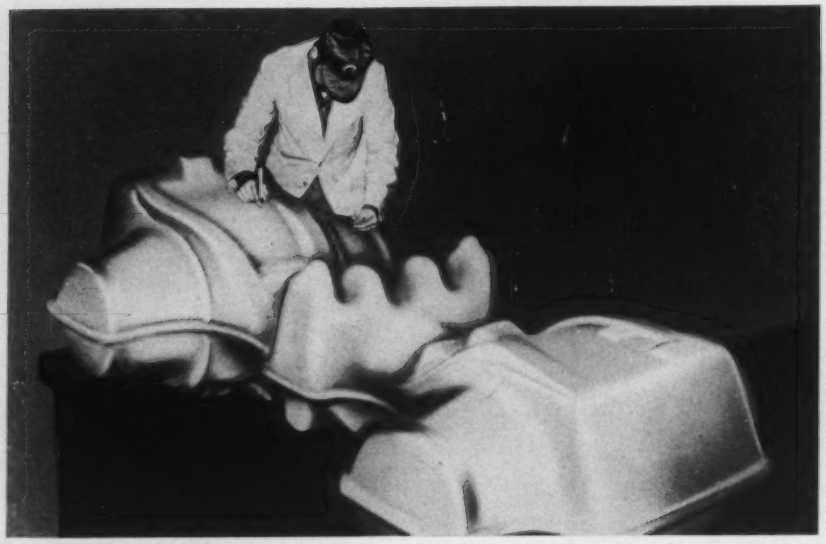
• **"One of the best ways to save tooling is to machine two or more parts from a single forging," states Steel Improvement & Forge.**

That approach is employed extensively by Grumman Aircraft Co., Bethpage, N. Y., for airframe parts. Advantages include lower machining costs, improved grain flow, strength



Automatic production of forgings is speeded by new Chambersburg Cecomatic impacters. Programer permits selection of five die positions of manipulator, ten blow intensities, as well as loading, unloading

Unusual Forging Shapes



Main axle beam forging for the B-70 weighs 10,000 lb, says Ladish Co. The jumbo piece is "intricately contoured" and is made of tough, H-11 die steel

and reliability of performance.

The same technique can be employed for gear blanks, steering arms, connecting rods, crankshafts. Pratt & Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn., buys three crankshafts in one piece, cuts them apart before machining.

At least 10 per cent of all production dies at Steel Improvement & Forge are composites.

• Heated, cast dies of Inconel 713C have been used by Armour Research Foundation, Illinois Institute of Technology, Chicago. The technique involves higher than normal temperatures (1600° F). Reduced cooling maintains work plasticity, enabling production of deeper, thinner sections.

Armour lists these potential benefits:

1. The technique broadens the dimensional spectrum.
2. It improves precision.
3. Properties are more uniform throughout the workpiece.
4. Fewer operations are needed to form exotic metals.
5. Parts can be forged at lower pressures or temperatures.
6. It speeds diemaking, which is a bottleneck.

Research has been completed on prototype dies, says Armour. Most important aspect: Casting in Bentonite bonded, graphite molds. Dies cast that way have surface finishes of 125 microinches which need no polishing, machining, or grinding. Tolerances are plus or minus 0.020 in. in an 8 in. length.

More than 250 aircraft quality forgings were made in AISI 4340 without producing any visible evidence of erosion, cracking, or heat checking.

Equipment Gets Bigger

Advances in space projects, atomic reactors, and aircraft have brought the demand for larger forgings, now ten times larger than those of World War II. So larger equipment has been developed.

• Ladish's 125,000 meter-kilogram, counterblow hammer can deliver a 1.1 million ft-lb sock—it is said to exceed the energy of the ultralarge Air Force presses at Wyman-Gordon Co. and Aluminum Co. of America.

• Cameron Iron Works recently put a 20,000 ton, multiple ram, forging press into operation. It can handle a 30,000 lb extrusion.

• Ultralarge equipment at Ladish is rolling out rings as large as 6 ft high, 24 ft in diameter, weighing 170,000 lb. U. S. Steel Corp., Pittsburgh, has mandrel forged an 81 ton ring, 159 in. in diameter, almost 4 ft high in nickel-chromium-molybdenum steel for the latest addition to the Shippingport (Pa.) reactor.

Wyman-Gordon notes that it helped develop 6000 and 8000 ton presses for its Harvey, Ill., plant.

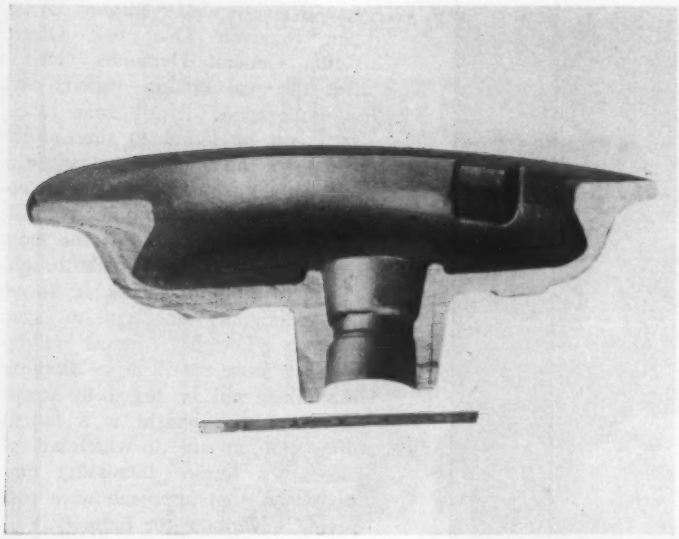
• Knowledge of forging shop equipment works to advantage of buyers.

Forge shops employ drop hammers and mechanical or hydraulic presses. Those who favor drop hammers claim these advantages: Short die contact time which results in longer die life; energy from a hammer blow puts heat into a forging, making it easier to maintain the proper working temperature.

Many automated shops use mechanical presses. One authority believes that many forging people are unaware of their potential, especially in straight, production work—gears, crankshafts, connecting rods. (See STEEL, May 1, p. 59.)

• Modern hydraulic presses can make 100 planishing strokes a minute, or up to 40 penetrating blows a minute. Many are equipped with variable, flexible, automatic controls which eliminate the need for operator control. The operator merely selects the conditions he wants by pressing buttons and setting dials—penetration, return, dwell, reselection, points out Industrial Equipment Div., Baldwin-Lima-Hamilton Corp., Philadelphia.

"Hydraulics are ideal for blocker presses," claims B-L-H. Their main



Back drafting (note the reverse draft on this wheel) requires special forming after forging, says Steel Improvement & Forge

purpose: Breakdown for mills. "Most companies have a variety of machines for plastic deformation—mechanical, hydraulic, hammer. At times, a blow of a hammer or mechanical press can open up cracks in some metals, so a hydraulic squeeze is substituted. Many people are still unaware that modern hydraulics are fast acting."

• Automatic handling and automamation are naturals for long run, mass production jobs. Some firms, like Chambersburg Engineering Co., Chambersburg, Pa., specialize in such equipment.

Chambersburg recently extended the automation of its Cecomatic forging equipment to bring great flexibility in job type operation. Here are the principal features:

Opposing rams now have ten energy levels which can be selected manually or through preprograming with tape or punched cards.

An automatic manipulator picks up heated billets, carries them through one to five die stations. Its positioning can be regulated, the sequence adjusted through the programer. It can also rotate the part.

The equipment needs only a minimum foundation for mounting or none. Costs are said to be much less than those of competing forging methods.

STEEL asked R. W. Van Hook, vice president, Clauss Cutlery Co., Fremont, Ohio, about the new Cecomatic. Compared with the previous method (drop forging), he notes that dies last longer, far less scale is produced, part dimensions vary less, greatly reducing the mismatch of mating parts (scissors, for example).

In another instance, Marion Div., Marion, Ohio, Eaton Mfg. Co., installed a 6000 ton, Ajax mechanical press for high speed forging. "This press accomplishes in three blows what smaller hammers used to take 25 to 40 to do," states Paul W. Olson, Eaton general sales manager. Other advantages of the automatic line: Less scrap, lower cost tooling, and quietness of operation.

• Fast heating furnaces are being pushed. Advantage: Easier forging.

"We have long advocated direct heating with a high heat differential to improve forging," states Selas Corp. of America, Dresher, Pa. "Fast heating approach improves forgeability."

This test backs up the contention: Identical steel cylinders (2 or 2½ in. long and as wide) were each heated in separate furnaces. One took 5 minutes; the other, 40 minutes. A ⅞ in. tungsten sphere pressed into each sample showed nearly one-fourth more penetration in the fast heated specimen.

Induction people also emphasize fast heating. The new, Loewy, four way, crankshaft press at National Forge Co., Warren, Pa., has an induction heater. Economies are achieved when material must be reheated several times, or when it is applied to only a small portion. Extra long crankshafts are formed one throw at a time—only the forming area is heated.

Here are some examples Selas gives to illustrate its approach:

An automatic, rotary hearth furnace handles 11,000 lb of 4 in. square billets every hour, taking 11 minutes to reach 2200° F. Scale is 0.004 in. thick, less than one-sixth as much as that produced in more conventional furnaces. Fuel cost: 3 per cent of material costs. In

Parts like this elephant ring are ten times larger than they were a few years ago. Made of C1045, the part weighs 124,000 lb, is 41 in. thick, 200 in. in diameter. Ladish produced the part in its new ring roller

Vacuum degassed steel increased the life of these dies at least a third, claims Finkl, Chicago. (Parts are drag link idlers for autos.) They were produced on a steam drop hammer

addition, the installation takes only 40 per cent as much space as the former equipment.

The furnace on the new Cecomatic at one firm heats small brass slugs to 1500° F at rates of 20 to 40 a minute.

• STEEL's survey notes an increasing interest in an adaption of electrolytic and electrical machining for diemaking.

Anocut Engineering Co., Chicago, has announced its latest unit has an output of 10,000 amperes which can remove 60 cu in. of metal an hour. It claims the largest previous source (3000 amperes) could only handle 18 cu in. an hour. ("We think the Russians can only take off less than 15 cu in. an hour," says the firm.)

Kropp Forge Co., Chicago, has set up its own diemaking shop, employing electrolytic die sinking methods.

Roy Larsen, vice president, manufacturing, Indiana Forge & Machine Co., Chicago, also confirms the general trend toward electromachining techniques. Ladish is following that trend and has checked out contemporary numerical control machining.

Ladish explains that essentially the same die materials are being employed to hammer forge both low and high temperature alloys. The firm looks especially for shock resistance in its tools. It is experimenting with die coatings.

• High temperature coatings to protect metals from contamination during heating are becoming increasingly important, points out Wyman-Gordon Co. Columbium cracking has been due primarily to gas diffusion along grain boundaries.

Oxygen diffuses along the grain boundaries of metals like columbium, forming a hard brittle layer. Depth of contamination after 2 hours at 2100° F is about 0.07 in. Coatings limit or entirely prevent such action, say experts.

What's Ahead

Consensus: High energy extrusion and forging with either explosives or high pressure gases continue to hold great promise. A few firms regularly employ Dynapak (Convair Div., San Diego, Calif., General Dynamics Corp.). But the real holdup, experts say, is die erosion. Until some lubricant can be found to successfully withstand the enormous pressures in such tools, expensive dies will continue to wear out too quickly. Still, many believe that this is the most promising area for a breakthrough.

Much profitable work is ahead in redesigning forgings to save weight. Dwight Allgood (Drop Forging Association) says: "Forging customers will be urged to accept the idea that weight is a fourth dimension, an area in which we excel. We foresee increasing emphasis on that approach as a cost saving advantage for industry."

To speed technical progress, more science is needed, many experts admit privately. For example, lack of ability to predict metal flow under all conditions of pressures and temperatures greatly complicates diemaking. (A recent Air Force report called it the greatest bottleneck in forging.)

• Experts at Armour offer several ideas for forging people.

Anybody who turns to high temperature die techniques ought to be able to double or multiply production. Armour's cast die and the high temperature die can be combined, although each has its unique advantages. (Work on cast billets is showing promise.)

"Extend your range of operations," advises Armour. Forgers can make their hydraulic presses into extruding presses. A 1000 ton press, for example, costs about $125,000. Adapted for extruding, it would run perhaps $200,000.

H. M. Harper Co., Morton Grove, Ill., exemplifies what Armour people call "painless diversification." Several years ago, the firm decided that extruded specialty fasteners and shapes in nonferrous, stainless, and nickel-base alloys constituted a promising field. It built up its business in the 1958-60 period to three shifts—recently, it cut back to 2½ shifts to catch up on maintenance.

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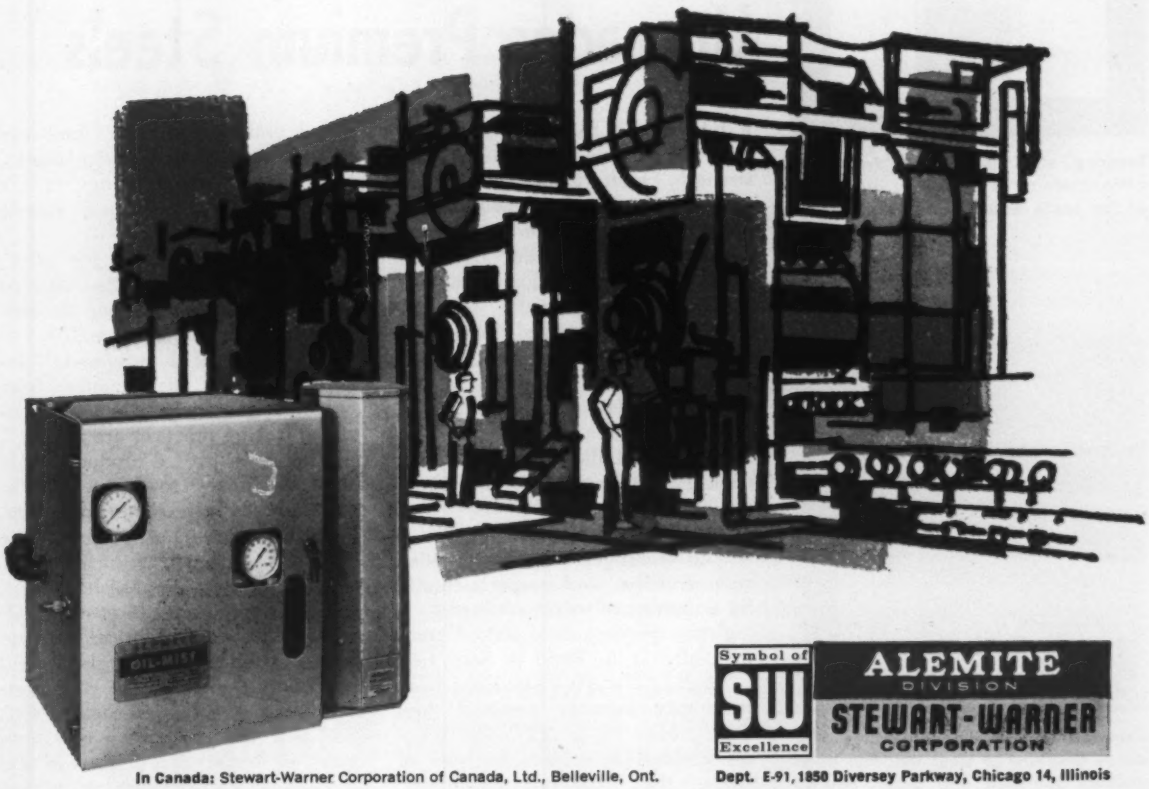

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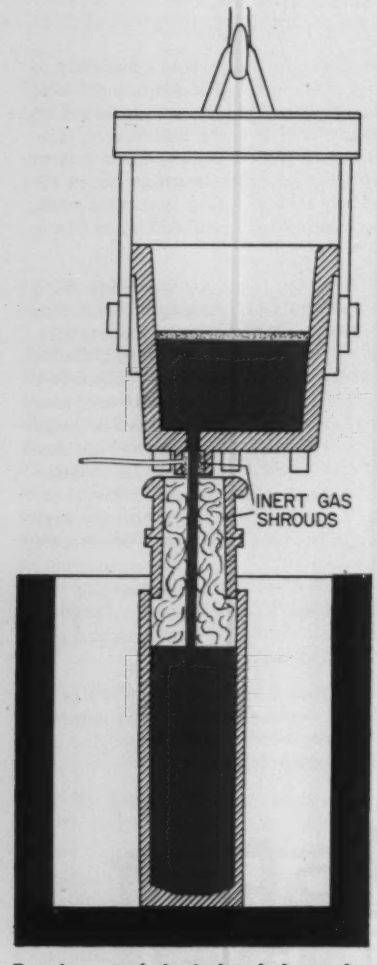
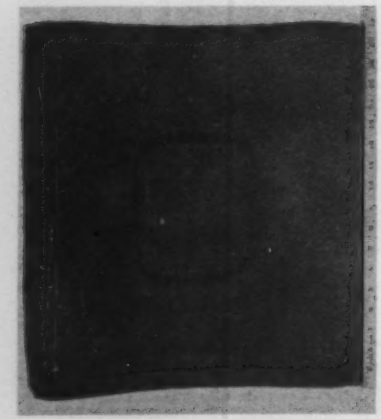
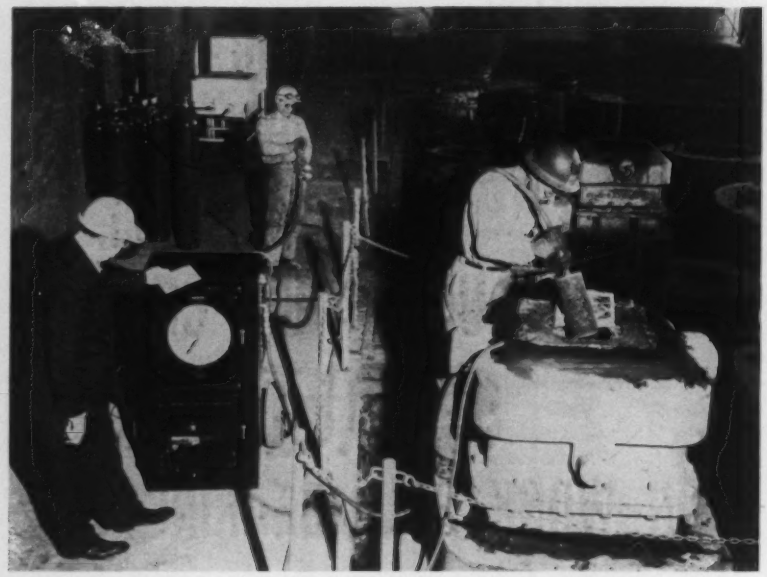


Teeming steel is isolated from the atmosphere by a blanket of argon gas at the ladle bottom and in the mold



Macroetched section illustrates the dense structure of steel that has been vacuum degassed and argon poured



Inert gas is used to purge ingot molds prior to pouring at A. Finkl & Sons

Argon Atmosphere Teeming Upgrades Premium Steels

• FABRICATORS who want improved performance from high strength, high temperature steels and alloys will be watching for more progress in argon atmosphere pouring, a process developed by Linde Co., New York, a division of Union Carbide Corp.

Ingot molds are filled with argon gas prior to teeming. The stream of molten metal is protected with the same inert gas. Result: A product that features less gas and fewer nonmetallic inclusions, lower conditioning costs, and minimum conditioning losses.

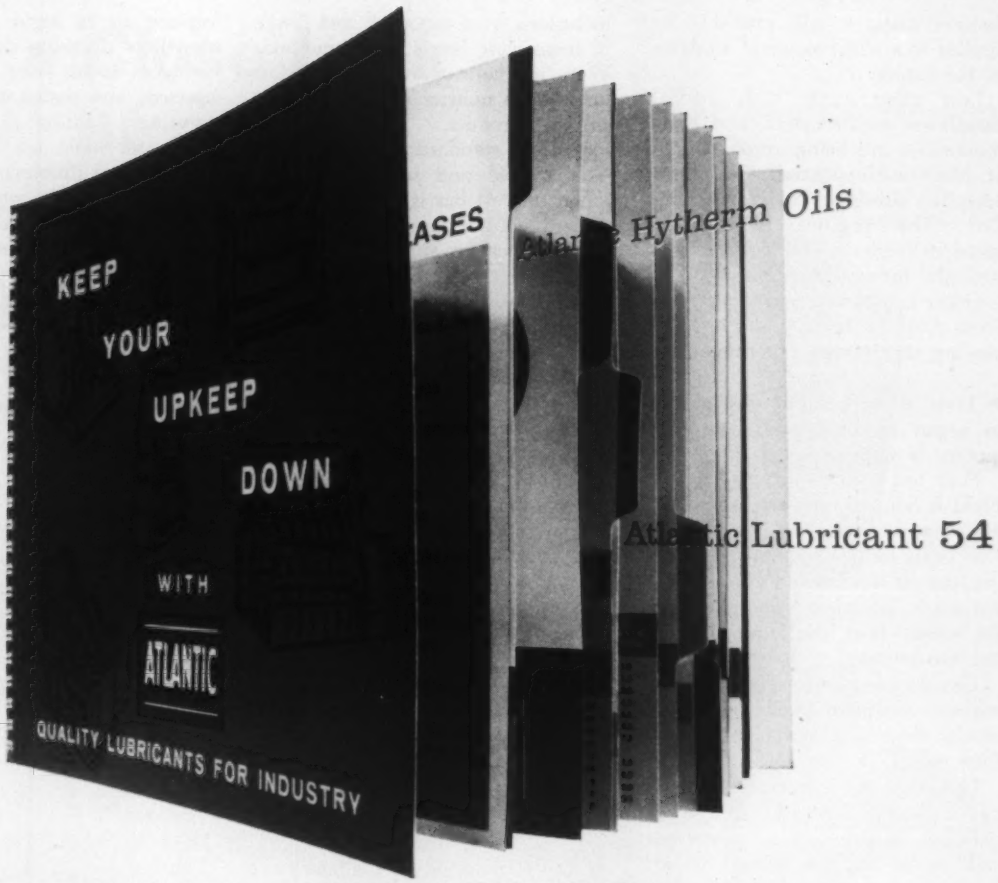
• The technique is being applied commercially and experimentally by a number of metal producers.

Argon pouring is practiced commercially at A. Finkl & Sons Co., Chicago, on steels that have been previously vacuum degassed (see STEEL, May 15, p. 23). The process is used for various analyses of steels that contain chromium, nickel, and molybdenum. End uses for the steels include valve blocks, high pressure steam fittings, missile handling equipment, and missile silo fittings.

The company also argon pours specialty steels—like those used in extremely large dies—when the customer wants higher quality, or where design of a part doesn't insure adequate performance from specified materials when conventional casting practices are followed.

The argon poured product is said to stand more severe service in forging dies. In some operations, the dies almost meet during the forging process, reducing the amount of flash on finished parts.

Corrosion and heat resistant alloys, slated for fabrication into plates, sheets, bars, forgings, and wire, are teemed in an argon atmosphere at Haynes Stellite Co., Kokomo, Ind., a division of Union Carbide Corp. The process is said to provide a modest saving in pro-



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duction costs; it will probably be applied to a wider range of analyses in the future.

Low alloy steels with critical cleanliness requirements, and some superalloys are being argon poured at Midvale-Heppenstall Co., Philadelphia, subsidiary of Heppenstall Co. The practice is said to speed deliveries of critical steels in wrought form (rings, billets).

Other companies, including Atlas Steels Ltd., Welland, Ont., are employing the process experimentally.

• Tests show reduced gas pickup in argon teeming, and macroetch quality is improved.

Four test ingots were made at A. Finkl & Sons to compare argon and air teemed steels. In the first of two heats tested, one, 17½ ton ingot was air teemed and another was poured in an argon atmosphere. In the second heat, the order of pouring was reversed.

Gas samples were taken from the surface, midpoint, and centers of blocks forged at midheight of the four ingots.

Gas analyses indicated 1.5 parts per million of hydrogen in the argon poured parts vs. 1.7 parts per million for samples teemed in air. Oxygen content was 31 parts per million in the argon teemed samples and 40 parts per million in the air poured parts. Nitrogen in the argon teemed samples was 26 parts per million vs. 37 parts per million for samples from air teemed ingots.

Improved macroetch quality and fewer freckle spots were noted on half slices prepared from the argon poured ingots and compared with similar samples from air teemed steel.

Appreciable reduction of oxide pickup is given much of the credit for a 3 to 24 per cent drop in conditioning losses.

• Improved cleanliness is evidenced by visual examination, ultrasonic testing, and magnetic particle inspection.

All argon cast ingots at A. Finkl & Sons were reported to have good surface quality, and required no ingot or product conditioning before final machining.

Forgings met extremely rigid ultrasonic inspection requirements.

Favorable results were reported in magnetic particle inspection; smaller inclusions were reported, and fewer of them were found. The method: Wet, magnetic particle inspection made on a quarter section adjacent to the product. The sample is forged to a standard diameter round, heat treated and smooth finished. Then the test bar is circularly magnetized, and a suspension of magnetic particles is applied to the surface. Examination under ultraviolet light reveals the presence and size of nonmetallic inclusions.

• Mechanical property improvements were noted in argon teemed ingots.

Mechanical properties were determined for 70, argon teemed, aircraft quality steel ingots at A. Finkl & Sons. The steel: AISI 4340, with more than normal silicon and molybdenum content. The ingots were forged into round sections 15½ in. in diameter.

Tensile strengths of 190,000 to 210,000 psi were noted in the tests, and 0.2 per cent yield strength ran from 178,000 to 195,000 psi. Elongation was 9.5 to 13.5 per cent, and area reduction was 28 to 43 per cent.

• Key to feasibility: Availability of argon in commercial quantities at a modest cost.

As recently as 20 years ago, argon was sold in liter bulbs as a rare gas. Today, Linde produces the gas in large volumes, transports it in liquefied form by tankcar for such ordinary uses as shielded arcwelding, blanketing of reactive metals, and degassing of molten metal. The liquefied gas contains no more than 40 parts per million of impurities, and has a maximum moisture content of 2 grains per 1000 cu ft, says Linde.

The low cost of argon casting—estimated by Linde to be 55 cents to $1.50 per ton of steel—isn't hard to justify when high cost products are involved. Aircraft quality steels, bearing steels, specialty, decorative, and stainless steels fall into that category. Argon teeming is said to maintain benefits already built into the metal by vacuum treating or remelting.

Lower reject rates can be expected on parts that get a ground finish when argon poured steel is used.

• A minimum of argon is used to replace air in ingot molds with a slow-flow diffusing device.

Ingot molds are cleaned, inspected, and sealed prior to argon teeming. Mating surfaces on the stool and mold are gasketed with asbestos and fiberboard, and silicate cement. Gaps between molds and permanent type hot tops are packed with asbestos rope and covered with mastic. The hot top opening is covered with an aluminum disc that rests on mastic and is held in place by a steel ring.

A flap cut in the aluminum foil allows the argon diffusing device and a gas sampling tube to be inserted. The flap is resealed after the mold is purged.

About 1½ to 1¾ mold volumes of argon are required to reduce oxygen concentration to less than 0.25 per cent at the mold-hot top joint vs. about seven mold volumes when a straight pipe or hose is used to deliver the gas at high velocity. Molds are teemed as soon as possible after purging.

Instrumentation is available to determine when molds are purged —a Leeds & Northrup oxygen analyzer is used at A. Finkl & Sons to check residual oxygen. The instrument is recalibrated for argon with analyzed mixtures.

A modified casting technique is being investigated by Linde. Plastic bags are placed in the molds and inflated with argon. The bags are said to provide smooth ingot surfaces; decomposition products, which are reducing in nature, don't contribute to ingot impurities.

• The teem stream is shrouded with argon from a header attached to the ladle bottom.

The bottom of the header is less than half an inch from the aluminum foil on the hot top opening when teeming is started. Shortly before the nozzle is opened, teem protection argon is turned on to prevent atmospheric contamination of the mold.

As molten steel falls from the ladle nozzle, it melts a hole in the aluminum foil seal. Expansion of argon atmosphere inside the mold and argon from the protective stream form an effective barrier against back diffusion of air. The aluminum seal remains intact except for the hole in the center) until the mold is nearly filled.

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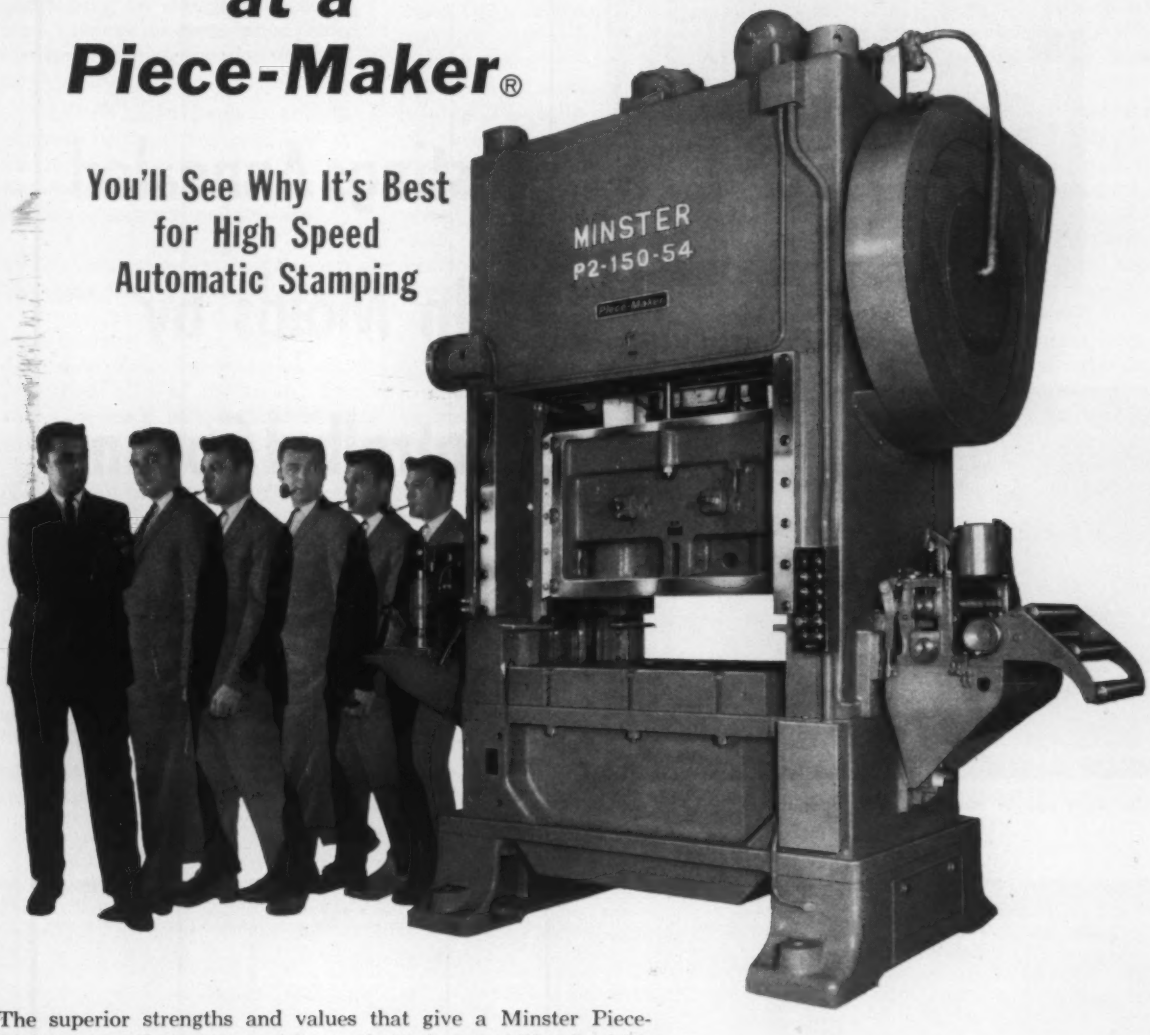

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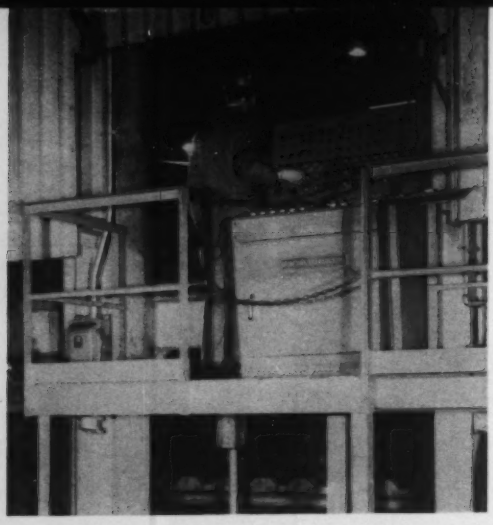
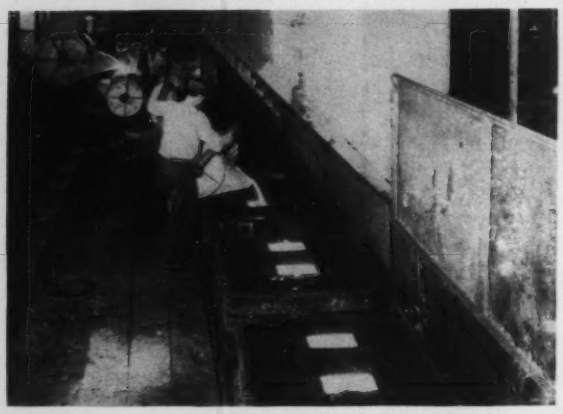
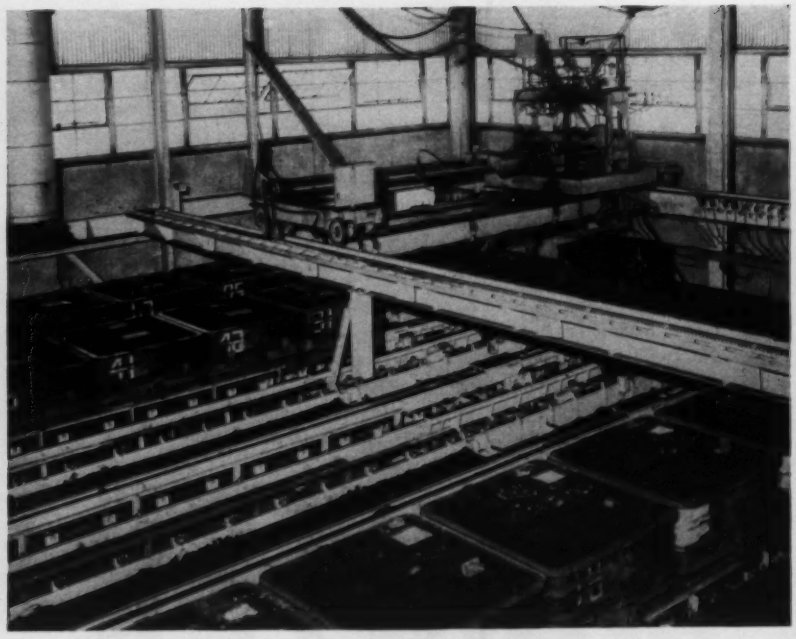


Console controls programing



Conveyor carries molds through pouring

From the distributing conveyor . . .



molds are picked up by bridge cranes and placed in annealing area

• ANNEALING by controlled cooling in molds has been incorporated into an automatic foundry line at Deere & Co.'s Malleable Works in East Moline, Ill. With automatic programing on storage and cooling lines, castings are prescription cooled for any designated period from ½ to 1¾ hours.

About 55 kinds of tractor and implement castings are produced on the line for shipment to the company's manufacturing plants. All of the castings are nodular iron.

• The line produces molds weighing about 4500 lb (including flask).

The permanent flasks measure 42 x 48 in. with a 12 in. cope, 12 in. drag, and 2 in. upset (sand over and above that of the cope). The automatic mold and flask handling equipment (furnished by Link-Belt Co., Chicago) is designed to handle 30 to 90 molds an hour through the cooling lines and up to 150 molds an hour from cooling lines to shakeout. The sand handling system (also furnished by Link-Belt) handles about 150 tons an hour of tempered sand and 250 tons an hour of shakeout sand.

• Nine men operate the line.

Personnel required: An operator, core setter, clamper, two pourers, unclamper, console programer, and parting station and shakeout operators.

An automatic molding machine alternately produces matching copes and drags. The machine delivers copes (with cavity down) to a cope conveyor and delivers drags to a Z-bar rollover. Cavity up, they go to the drag conveyor. Cores are set in drags manually as they advance on the conveyor. At the closing station, copes and drags are aligned and closed automatically, then moved to the placing station. En route, the molds are manually clamped together. At the placing station, molds are placed automatically on the mold conveyor pallets.

The mold conveyor is a roller type, powered unit that travels an L-shaped path for about 108 ft. Variable speeds permit handling 30 to 90 molds an hour.

The continuously running conveyor carries the molds through the pouring area, through a short tunnel where hot gases and fumes are exhausted, and to the unloading end of the conveyor. The unloading equipment moves the poured mold onto a distributing conveyor and places the empty pallet on the return run of the mold conveyor.

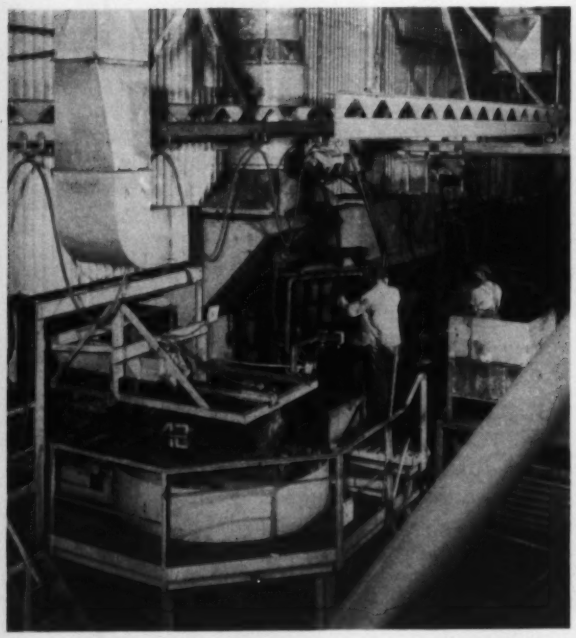
• Annealing time is maintained to an accuracy of ±5 minutes.

Molds are transferred automatically from the distributing conveyor to any of the six cooling lines by a traveling transfer bridge (two at the entry and one at the delivery end). An operator at the programing console selects the lines to be loaded and the number of molds for each line. Each of the six lines holds up to 19 molds. Another line is used for empty flask storage.

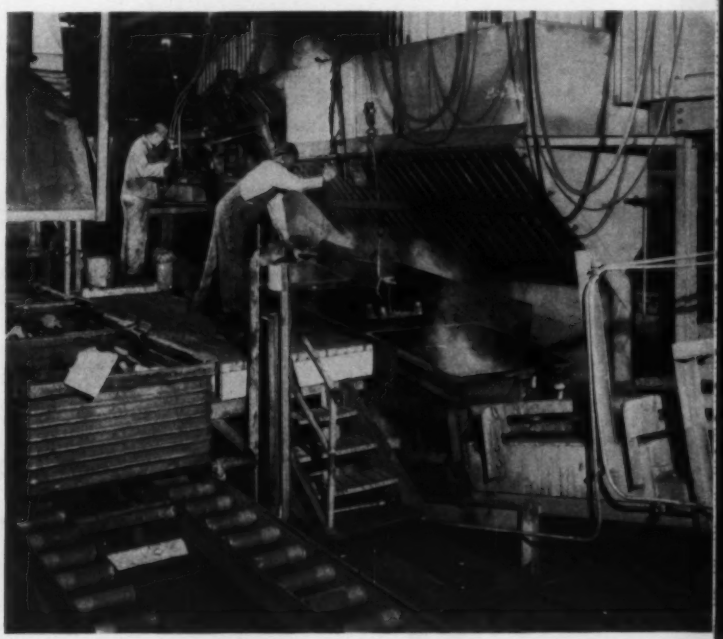
The operator also programs the removal of molds from the cooling lines.

After the prescribed cooling, the molds are conveyed to a shakeout via a turntable which turns the molds 90 degrees. An operator removes the clamps (manually) from the mold and, by pushbutton startup, the mold is advanced onto the cope removal station (an operator removes the cope with a hoist). The drag moves forward onto the shakeout. The cope (which was lifted by the hoist) is now rotated 180 degrees about the trunnions and lowered into position for transfer into the shakeout. Castings are removed from the drag (while it is on the shakeout) by a second hoist and deposited in a tote box.

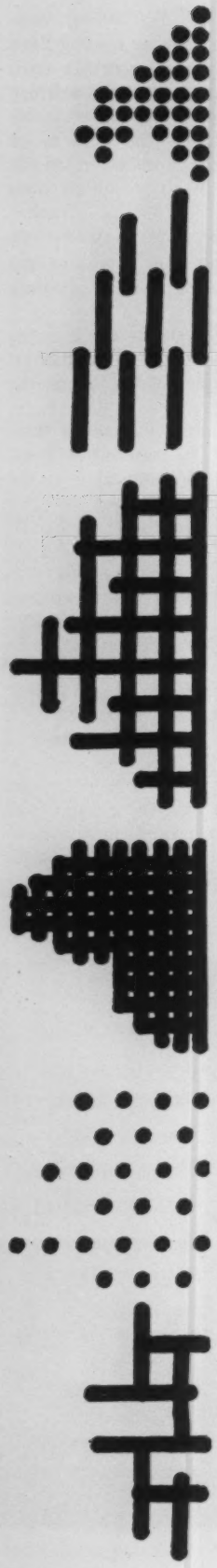
A hopper beneath the shakeout (a Link-Belt 5 x 12 ft unit) delivers sand to a conveyor setup. The used sand is carried to the sand preparation area. Shakeout rate is about 150 molds an hour.



After annealing, clamps are removed from mold . . .



and it is moved to shakeout



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Tracer Permits Change In Gear Production

FORGED STEEL ring gear blanks, 18 in. OD and weighing 120 lb, are completely contour machined in 6 minutes and two machining cycles. The cutting tools take off 26 lb of metal.

Heart of the new machining operation is a double, hydraulic tracer attachment on a standard lathe. Built by Detroit Broach & Machine Co., Rochester, Mich., the attachment allows the work to be approached with cutting tools on two sides simultaneously.

The job can be done with tracers in two operations; one machine does preliminary facing and boring. The second machine, with the tracers, turns the back angle of the part, cuts the radius and front face angle, turns the radius on the front side, bores the inside diameter, faces the web, and chamfers the bore. One operator runs both machines.

The same job used to be done this way: A machine did the back facing and boring. Then the parts were put on a six-spindle automatic for rough machining, and moved to another six-spindle automatic for finish machining.

The two tracer systems are tied into a single control center. Both tracers are mounted perpendicular to the lathe spindle, allowing the front and rear units to approach the work from both sides. They are mounted to clear the lathe bed sufficiently for ample retraction in loading and unloading. The front tracer turns the back angle, radius, and front face angle, while the rear tracer turns the radius, bores the inside diameter, faces the web, and chamfers.

Blank sizes run from 6 to 24 in. in diameter. Changeover time from one gear blank size to another is less than an hour. All that needs to be done is change the two templates, adjust the tool block, replace the expanding collet on the spindle. The same cutting tools can be used on all jobs.

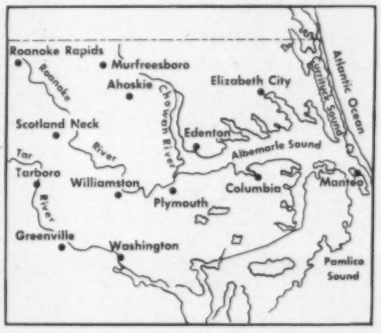
Machining is done at 200 sfpm for both roughing and finishing. The two steel grade carbide cutting tools are fed into the work at a constant rate of 0.015 in. The feed rate is controlled automatically by the tracers.

Single-Place Gyrocopter by Bensen Aircraft Corp.

Looking for production savings?

Look into Northeastern North Carolina

Few advantages can yield such savings as a willing, conservative work force and a contented staff. And Northeastern North Carolina can help you enjoy both. The state home-grows two workers for every one who retires or moves. And this area's hospitable communities, magnificent beaches, lakes and rivers . . . set in a mild, vacationland climate . . . make it easier to move key personnel here. Write, wire or phone VEPCO for plant site and economic data on this growing industrial area within overnight range of New York, Pittsburgh, Cincinnati and Atlanta.



VEPCO VIRGINIA ELECTRIC and POWER COMPANY

Clark P. Spellman, Manager—Area Development, Electric Building, Richmond 9, Virginia • MIlton 9-1411
Serving the Top-of-the-South with 2,086,000 kilowatts—due to reach 2,720,000 kilowatts by 1963.

Navy Gets Hydraulic Press With 41,000 Ton Capacity

A DIRECT ACTING, hydraulic press, undergoing final Navy testing and inspection at Verson Allsteel Press Co., Chicago, has delivered 63,000 tons of forming force, far above its rated capacity.

To be used for forming metal components of aircraft and missiles, the machine will be delivered to Grumman Aircraft Co., Bethpage, N. Y.

In the machine, a laminated, cylindrical pressure vessel that's capable of withstanding extreme pressures from within provides the main press body. A fluid cell in the roof of the cylinder is inflated with hydraulic fluid to provide forming pressure. The pressure is exerted on metal blanks arranged on a tray which has been moved into the bottom area of the pressure cylinder.

• **The Squeeze**—The fluid cell expands to fill the unoccupied area within the cylinder and shapes the metal blanks around form blocks.

Four trays have been provided with the press. While one tray is in the cylinder, the other three are available for loading or unloading of parts. Two trays are used for forming parts cold, the other two trays are provided with elements to heat the blanks up to 600° F, as required for hot forming of special metals. Cold trays can form to a depth of 10 in. while the hot trays will form parts 6 in. deep.

The press is operated from a master control console or from two auxiliary stations with the operators communicating by telephone. From the stations, all trays can be maneuvered laterally and into or out of the cylinder. It takes less than 2 minutes to completely form a tray of parts.

Epoxies Save Time For Patternmakers

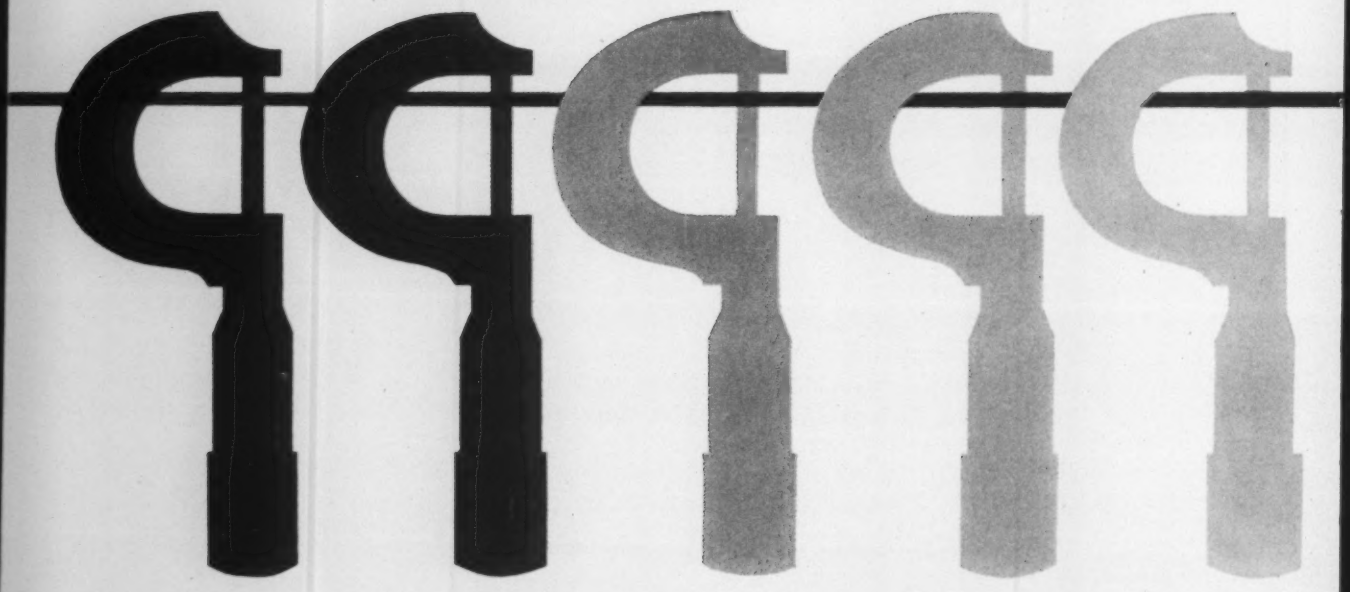
EPOXIES save time, labor, and material costs for the Milwaukee Works, International Harvester Co.

The plant supplies gray iron products for farm implements. "We couldn't have developed some of our products without epoxy plastics," claims Martin Ehrman, pattern shop superintendent. "Success depends on how creative you are—we seem to come up with a new use almost every time we apply the material."

• **Cites Properties**—Lightness, durability, and resistance to warping or corrosion make epoxies ideal for prototypes, fixtures, die models, and spotting racks, points out Ren Plas-

ANOTHER NORTON PRODUCT

Now—abrasive belt machining grinds sheets, strip, and



tics Inc., Lansing, Mich., a main supplier. And plastic tools are easily modified or repaired with plastics because such materials make essentially strainfree structures, it says.

"When we patch worn wood patterns, plastics have cut our repair time as much as 40 per cent," states IH's Mr. Ehrman.

Rectifiers Cut Power Costs

SEMICONDUCTORS saved a million dollars in installation of electrical equipment at the new Baltimore refinery of Kennecott Copper Corp., claims the firm's electrical engineer, D. T. Young.

The savings in no way compromised reliability or production capability, Mr. Young told participants at the Salt Lake City, Utah, meeting of the American Institute of Electrical Engineers.

• **Cheaper Direct Current**—Recent introduction of high capacity semiconductor rectifiers of germanium and silicon made possible the substitution of rectifiers for motor-generators. "Even in 1957, when the plant was designed, rectifiers cost less than 60 per cent as much as motor - generators," stated Mr. Young. Rectifiers can be remotely controlled, eliminating the need for operators.

Additional savings were realized by locating the rectifiers near their loads. Also, by controlling them with induction voltage regulators, the firm achieved a power factor of 90 per cent, eliminating any need for corrective equipment.

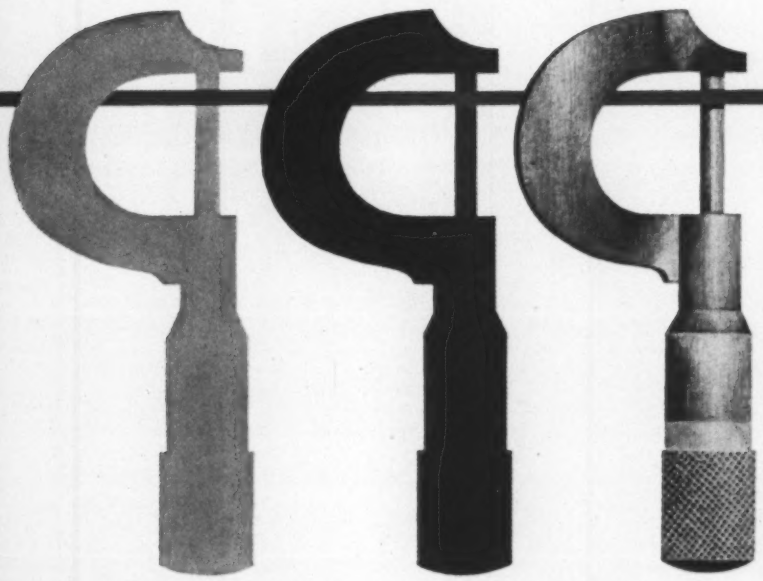
• **Supplied with Motors**—Another example — cranes — illustrates the impact of rectifiers on industrial electrical equipment. In Cleveland, the Electric Controller & Mfg. Div. of Square D Co. points out that heavy duty overhead cranes need not employ alternating current only since controllers are now made with self-contained rectifiers. Such equipment improves flexibility and simplicity of a hoist, says Square D. For example, only 16 trolley collector bars are required to control four hoist motors, two trolley motors, and power for a lifting magnet. Motors also develop more torque at full load, says Square D.

German Firm to Operate Mile-a-Minute Rod Mill

STEEL RODS will be delivered at speeds up to 6900 fpm by a continuous mill that is being built for a German firm, Huttenwerk Oberhausen A. G. A contract for construction of the mill has been awarded to Schloemann A. G., Dusseldorf.

The facility, which will have a monthly output of 30,000 tons, will roll rods 13/64 to 51/64 in. in diameter from $3\frac{1}{8}$ in. square billets. Rolling equipment will include a four stand roughing train, and two stand intermediate and finishing trains. An additional four stand finishing train with horizontal and vertical stands will be available for exact round rolling.

stainless steel coil to precision tolerances



BEHR-MANNING ABRASIVE BELTS, used on a wide variety of new machines, are providing industry with high-speed precision grinding that reduces production costs, makes better materials available for fabrication, and solves fabrication problems themselves.

Can abrasive machining cut your costs, make your products more widely applicable? Very probably. And we'll be happy to help you find out. It's a fact that Behr-Manning devotes more men, facilities and resources to coated abrasive research and development than anyone else in the world. And brings you the coated abrasives you need where and when you need them.

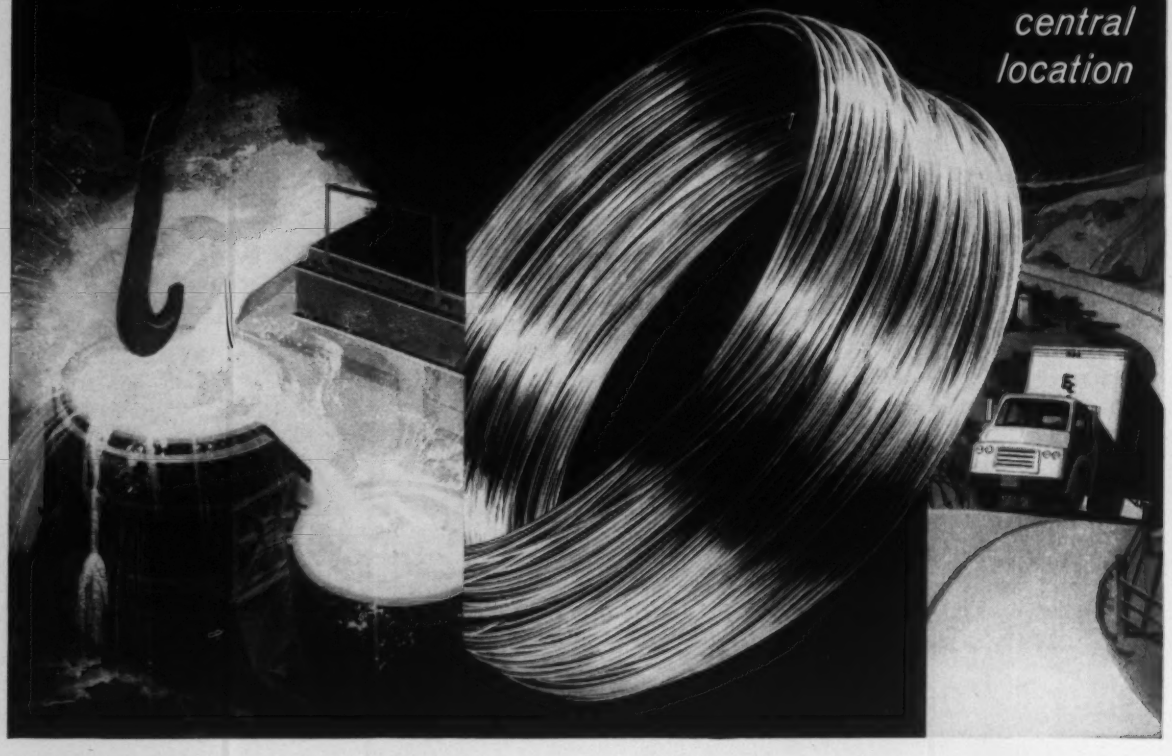
BEHR-MANNING CO., Troy, N. Y., a division of Norton Company.

BEHR-MANNING

Abrasive Engineering

CONTINENTAL STEEL

from furnace... to the finished wire... shipped direct from one central location



GIVES YOU DIRECT LINE SERVICE IN WIRE

BRYTITE®—New patented galvanizing process with a tight, brilliant bright coating that takes severe forming without flaking, powdering or peeling.

TINNED—outstandingly smooth and lustrous, so bright that it can replace plated wire for many products.

KOKOTE®—Redrawn galvanized wire with unusually bright chrome-like lustre.

UPHOLSTERY SPRING WIRE—high carbon spring wire for automatic Coiling and Knotting and other types of upholstery construction.

MB HARD DRAWN SPRING WIRE—for severe deformation in the fabrication of mechanical springs. Sizes for many uses.

Here are unique advantages of using Continental Wire: All our operations are in Kokomo—there is no criss-cross misrouting or multi-handling, no red tape involved when you write or call in your order, or hand it to your Continental representative, *no follow-up delays*. You get the kind of personalized service that will please you. And you get seasoned, knowledgeable assistance from a trained wire specialist on any wire problem. Try Continental direct line service and see! Write today for your free copy of our new wire manual.

CONTINENTAL STEEL
CORPORATION • KOKOMO • INDIANA

PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE®, BRYTITE®, FLAME SEALED®, Coppered, Tinned, Annealed, Liquor-Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric. Nails, Continental Chain Link Fence and other products.

WIRE SPECIALISTS FOR OVER HALF A CENTURY

Steel

Machine Mills Columns, Beams, Other Structurals

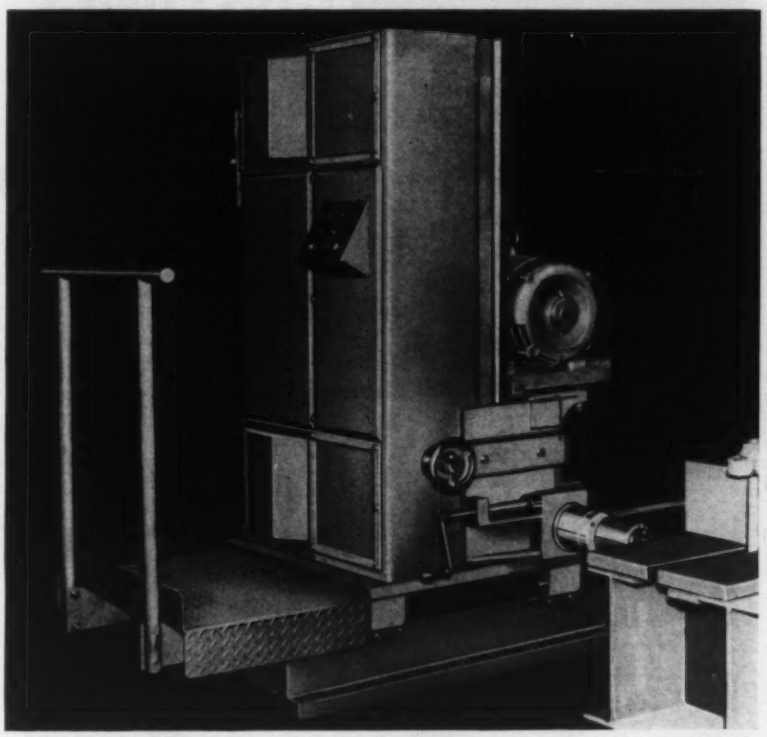
HERE is a low cost machine for milling columns, chords, beams, and other structural steel shapes. The unit weighs 4000 lb, stands 72 in. high, and is 96 in. long. The machine mills areas 2 in. wide by 1/8 in. deep at 45 in. per minute.

The 15 hp spindle has 42 in. of vertical travel, 66 in. of horizontal travel (extended horizontal travel is available), and a 3 in. micrometer handwheel infeed. Standard spindle speed is 1200 rpm (changeable with belt and pully adjustment). All movements are controlled from a panel.

Such features as prelubricated tapered roller bearings, replaceable hardened and ground bar ways, and efficient ball screws for vertical and horizontal feed assure minimum maintenance.

NEMA controls (Type 1-A, dustproof) are accessible through hinged sheet metal doors.

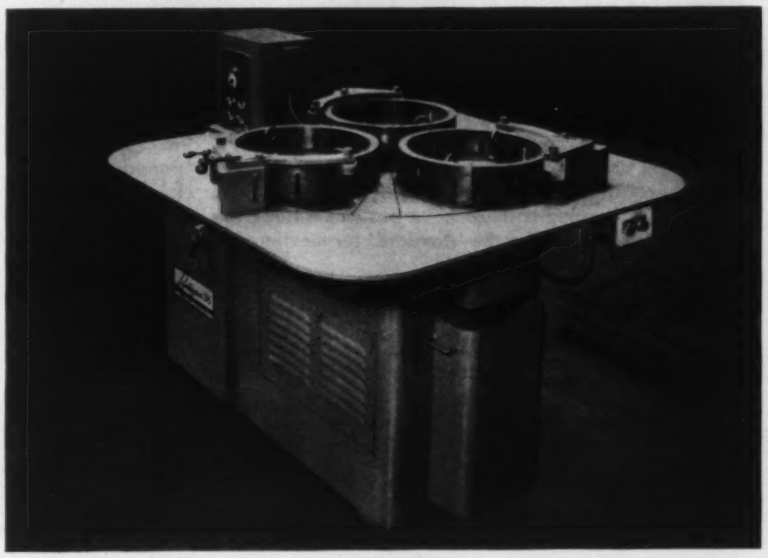
For further information, *write* Futurmill Inc., 19720 W. Eight Mile Rd., Southfield, Mich.

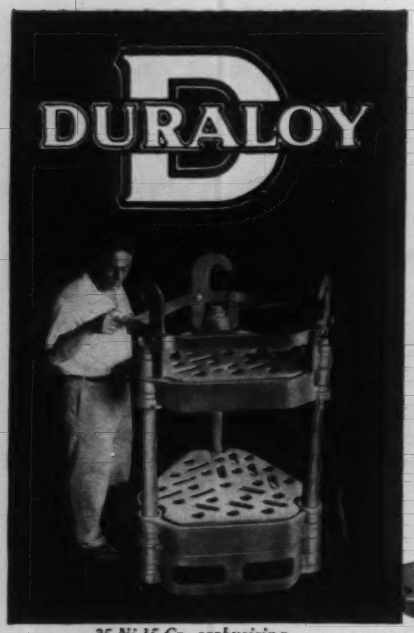


Lapping Unit Keeps Abrasive Mixture Right

AMONG THE features of the redesigned Model 36 Lapmaster is an abrasive distribution system which maintains the correct mixture of compound to vehicle from initial filling to the last drop. Pressure pumping at a constant head helps assure uniform deposit at the lapping stations. An adjustable flow control aids in obtaining maximum stock removal. The pump and tank are mounted on the inside of a door in the machine base.

The adjustable worktable can be raised or lowered to the same plane as the lap plate. A remote start and stop station permits easier loading and unloading of parts from almost any position. The machine can produce a uniform 2 to 3 mi-





High Alloy CASTINGS for METAL TREATING

35 Ni 15 Cr carburizing furnace casting

35 Ni 15 Cr heat treating furnace casting

Heat treating stools for 1750° operations

● **Sound castings to withstand the high operating temperatures and wide temperature ranges without deformation.**

Nickel-chrome castings have long been the 'standard' for heat treating and annealing operations—and for close to forty years Duraloy castings have been considered by many metal working plants to be the 'standard' for meeting the industry's sound casting requirements.

The three Duraloy castings illustrated typify the kind of work we do for the metal treating plants.

We're in a position to cast any shape or size and of any alloy to meet your requirements. Send for Bulletin G-159.

ALLOY CASTING INSTITUTE ACI MEMBER

DURALOY Company

OFFICE AND PLANT: Scottdale, Pa.

Eastern Office: 12 East 41st Street, New York 17, N. Y.
Chicago Office: 332 South Michigan Avenue, Chicago, Illinois
Detroit Office: 1025 Maple Road, Troy, Michigan
Houston Office: 4101 San Jacinto, Houston 4, Texas

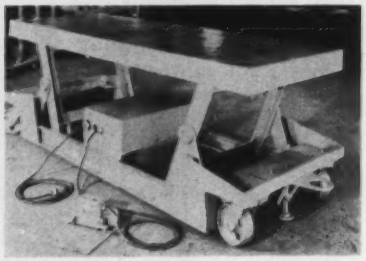
NEW PRODUCTS and equipment

croinch finish.

For further information, *write* Dept. SL-3, Crane Packing Co., 6400 Oakton St., Morton Grove, Ill.

Feed Table-Truck Handles 6000 lb Loads

AN ELEVATING feed table and transport truck (Model 600 Steelmobile Senior) has been designed for feeding metal sheet and plate stock to punch presses, shears, and similar equipment.



Using a heavy duty scissors mechanism, the unit can handle 6000 lb loads. Two top sizes available: 36 x 96 in. or 36 x 120 in.

For further information, *write* Jarke Mfg. Co., 6333 Howard St., Chicago 48, Ill.

Lightweight Plasma Gun Has Many Advantages

A PLASMA gun developed by Avco is termed a practical, versatile, production tool. It's 5 in. long and weighs 3½ lb.

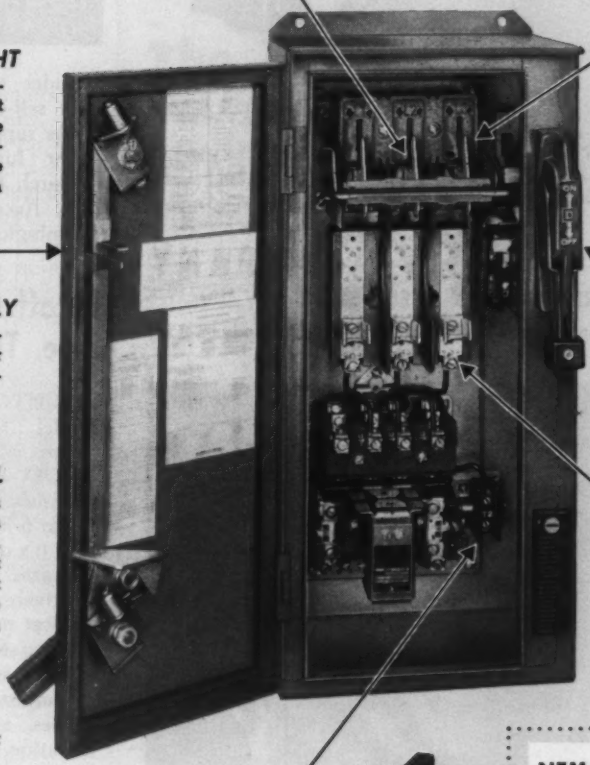
The company says the unit will spray coatings (including refractories) with a controlled thickness, density, and bond strength that could not be obtained previously. The company adds that the gun can also be used to fabricate free standing forms more economically than by traditional methods.

The model has an integral adjustable cathode control. High regulation of powder feed (by an electromechanical system using a vernier control) permits the use of powders that previously were too fine for plasma guns. A complete system

All these Square D features make this

THE SAFEST, MOST RELIABLE COMBINATION STARTER

VISIBLE BLADES You can see the switch is open and know you're safe!



REALLY DUST-TIGHT

NEMA 5-12 construction keeps out dust and coolant. Positive door-closing mechanism assures complete seal before switch can be operated.

DOOR CLOSES SIMPLY and EASILY

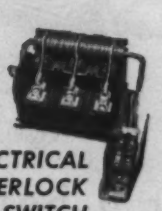
No cover bolts to secure—just push door shut and turn door handle to close and seal.

EASY TO INSTALL

Through wiring with no interference from disconnect switch. Line terminals are at top, load terminals at bottom. Starters can be ganged with less than ½ inch between them.

WIDE RANGE OF SIZES

New Square D combination starter now available in NEMA Sizes 0 through 4.



ELECTRICAL INTERLOCK ON SWITCH

Optional single or double-pole interlock available to disconnect separate control circuit power. Assures complete safety!

FOOL-PROOF OPERATING MECHANISM

Handle is permanently attached to switch to eliminate hazard of false handle indication. With door open, the switch can not be operated accidentally.

CONVERTIBLE FUSE CLIPS

If horsepower or voltage requirements change, modification kits provide easy change of fuse clip size and spacing.

3rd OVERLOAD RELAY

Space to add an additional overload relay when desired.

NEMA TYPE 1 ENCLOSURE ALSO AVAILABLE

NEMA Type 1 enclosures, offered in Sizes 0 through 4, can be modified by addition of a pushbutton, selector switch or other accessories. Easy-to-use kits simplify field installation.

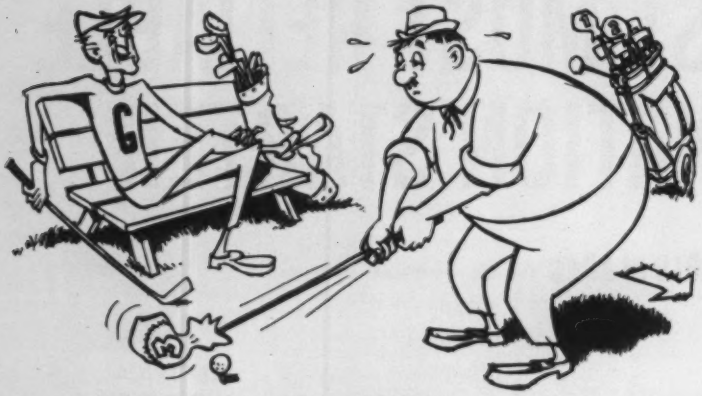
Write for Bulletin SM-292. Address Square D Company, Dept. SA, 4041 North Richards Street, Milwaukee 12, Wis.

SQUARE D COMPANY

wherever electricity is distributed and controlled

Mr. SHOTT and Mr. GRITT

"One thing that may have been giving you trouble . . .
you've got the wrong sock on your driver!"



For a better finish

start with ALSTEEL SHOT AND GRIT

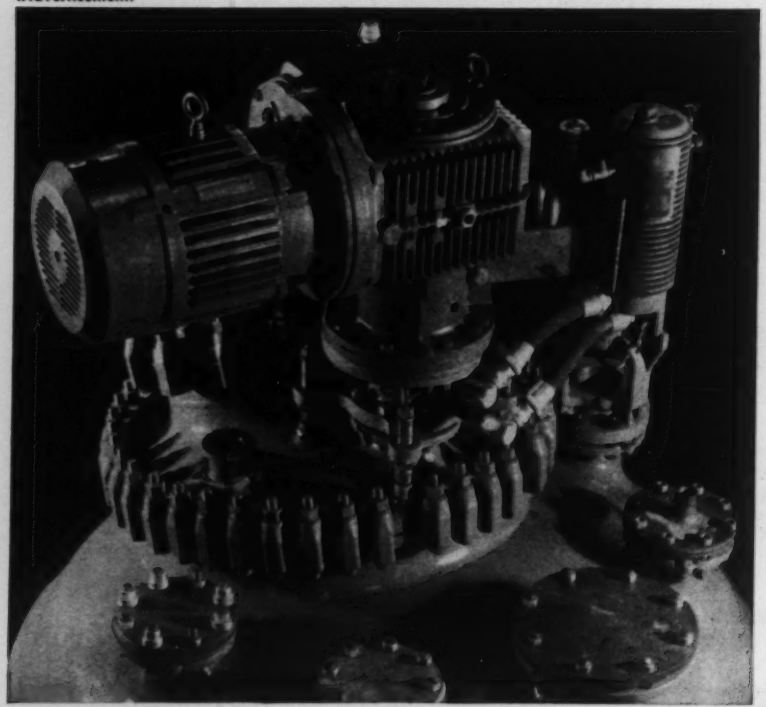
GENUINE ELECTRIC FURNACE STEEL ABRASIVES

ALLOY METAL ABRASIVE COMPANY

ORIGINATORS OF CAST STEEL SHOT

121 South Division Street, Ann Arbor, Michigan Phone: NOrmandy 3-8529

(Advertisement)



ROCHESTER, N. Y.—The Pfaudler Co. reports space savings and reduced maintenance on their new line of TW Agitation Drives for glassed-steel and alloy mixing vessels due to vertical hollow-shaft double-enveloping worm gear reducers by Cone-Drive Gears, Division Michigan Tool Co., 7171 E. McNichols, Detroit 12, Michigan.

NEW PRODUCTS and equipment

includes the gun, control console with self-contained powder feed, a power supply, and a spray booth.

For further information, *write* Research & Advanced Development Div., Avco Corp., 201 Lowell St., Wilmington, Mass.

Cutoff Machine Saws Pipe, Tubing, Flat Stock

A CUTOFF machine designated Model 102-A cuts solids up to 4 in. square, pipe and tubing up to 6⅝ in. OD, angle iron up to 6 x 6 in., channels up to 8 in., and flat stock up to 6 x 1 in. The manufacturer says it's designed to provide the advantages of abrasive cutting at a relatively low investment.

Most metals can be cut at a rate of 3 to 4 seconds per square inch. Cutting is aided by oscillation, easily adjustable carbide tipped wheel guides, and by good coolant distribution.

A large, separate, coolant tank is mounted on casters to permit easy removal for cleaning. Separate

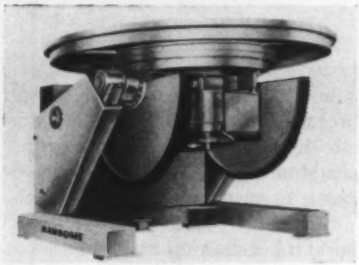
compartments settle out sludge and keep coolant clean. Coolant is conveyed by hose to a distributor inside the wheel guard.

For further information, *write* Allison-Campbell Div., American Chain & Cable Co. Inc., 929 Connecticut Ave., Bridgeport 2, Conn.

Versatile Positioner Rated for 80,000 lb

VERSATILITY is stressed in an 80,000 lb capacity (at 20 in. center of gravity) positioner that comes with a 36 in. vertical adjustment. There is no column projection above the table top—even with the table in a horizontal position.

Power operated tilt and rotation are available. Separate motors and positive gear trains are used. Rotation is provided by a 20 hp, electronic, variable speed drive working with two electrically shifting transmissions. The combination provides a wide speed range of 480:1 and enables the rotation of weldments from a minimum of 2 ipm at 12 ft diameter to a maximum



of 100 ipm at 16 in. diameter. Speed control is operated remotely by potentiometer. The table is 12 ft in diameter.

For further information, *write* Ransome Co., Scotch Plains, N. J.

Speed Reducer Motors Are Changed Easily

EASY installation and interchange of motors is a feature of Delroyd, worm gear, speed reducers. Any standard NEMA Type D flange motor can be specified in ordering. An involute helicoid thread form is used. Gears are centrifugally cast.

Available are eight sizes of reducers for 1 to 20 hp motors with 2½ to 8 in. center distances. Speed

NOW...

a New Member of the Wright Speedway Hoist Family...

The W-1 ELECTRIC...BUILT TO YOUR NEEDS FOR SPEEDY, RUGGED DUTY IN CLOSE HEADROOM LOCATIONS

The W-1 Speedway is a hoist it will pay you to meet without delay. Completely new in design, it can be tailor-made to your exact job requirements for high handling efficiency, low maintenance costs and longer service life. You can choose the W-1 in capacities from 1 to 3 tons...with single, two-speed or variable speed controls... lug or base mounting; plain, geared or motorized trolleys...two or four part reeving. For close headroom application, the WH-1 is available in capacities of 1 to 2 tons. Both models can be equipped with Wright's own built-in overload cut-off for 3-way protection of operator, load and hoist. Hoists are factory tested at 50% above rated capacity before overload equipment is installed.

OTHER W-1 SPEEDWAY FEATURES

Motors—Fully enclosed, ball bearing type. Built to NEMA specifications and rated on basis of 30-minute duty cycle.

Bearings—Anti-friction, precision ball or roller bearings support both ends of all shafts. They are mounted in splash oil lubricated gear chamber.

Motor Brake—External expanding jaw, self-adjusting cam type; operated by solenoid.

Drum—Fabricated all-steel construction with liberal drum to cable diameter ratio to reduce wear and cable fatigue.

ACCO

See your Wright Distributor

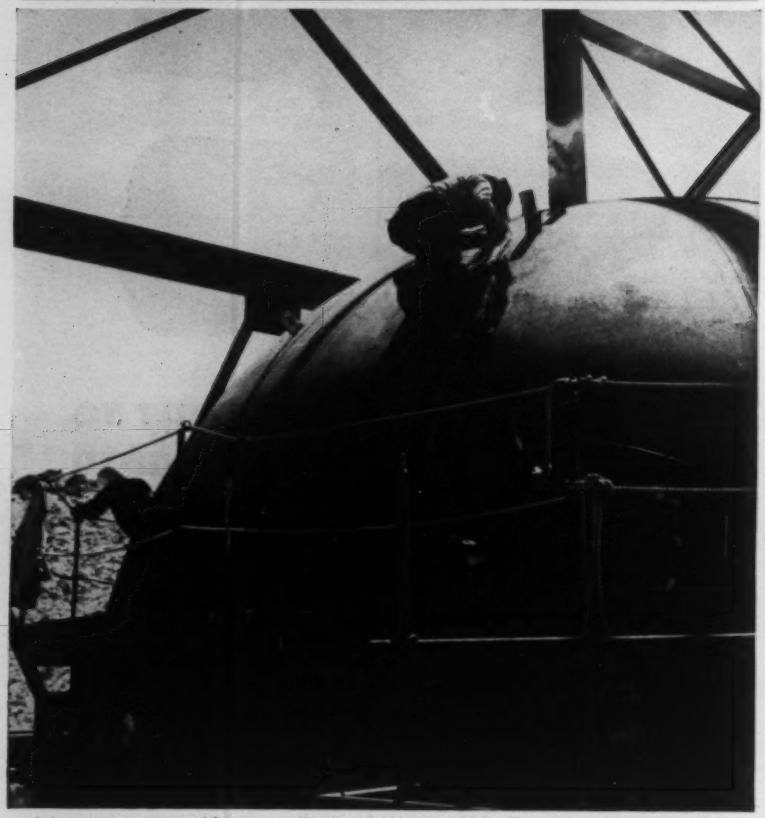
for complete information about the W-1 or write us at York, Pa. for Bulletin DH-173

WRIGHT HOISTS

Wright Hoist Division · American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

WELD WITH ARCOS STAINLESS ELECTRODES



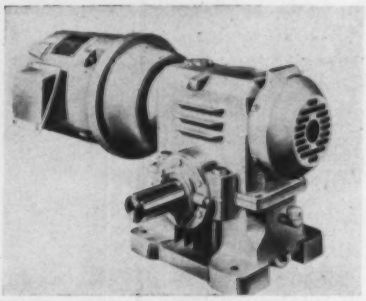
Job report courtesy of Southwest Welding & Mfg. Div., Yuba Consolidated Industries, Inc. Alhambra, California

World's largest liquid oxygen tank calls for pioneering in stainless welding. This 75,000 gallon vacuum bottle for liquid oxygen was fabricated from Type 321 stainless. Specifications required strong sound welds having maximum notch toughness at low temperatures. After extensive impact testing at minus 320°F Arcos electrodes, designed for low carbon and specific ferrite ranges, were selected. The precise weld metal properties delivered by Arcos on this job are available for all your stainless welding jobs.

ARCOS

Arcos Corporation • 1500 S. 50th St. • Philadelphia 43, Pa.

NEW PRODUCTS and equipment



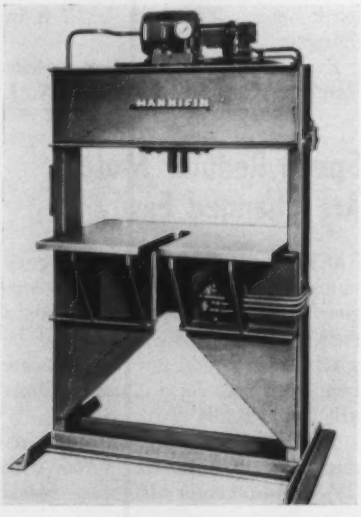
ratios run from 5:1 to more than 70:1. Single or double extended gearshafts are available. Motor and wormshafts have couplings that require no lubrication.

For further information, *write* De Laval-Holroyd Inc., 121 First Ave., Trenton 2, N. J.

Presses Feature Wide Component Selection

A LINE of hydraulic ram type, or guided platen, utility presses utilizes a component selection concept. The concept makes possible a broad choice of standard frames, working forces, speeds, circuits, controls, and power sources. You can design presses for specialized production jobs by simply selecting the proper combination of standard components to meet preset requirements.

Structural steel frames meet NMTBA deflection standards. You can select from 25, 50, 75, and 100 ton capacities in ram and guided



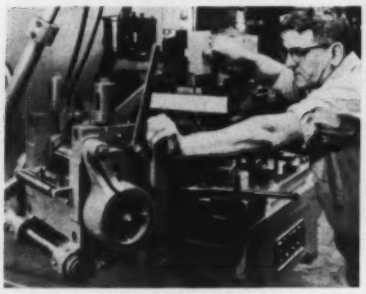
platen models with a choice of 24 x 24 in. or 36 x 24 in. die areas. Seven power sources are available to provide a wide range of press speeds.

For further information, *write* Dept. 124, Hannifin Co., 501 S. Wolf Rd., Des Plaines, Ill.

Portable Press Feed Handles Stock 8 in. Wide

A SWINGOUT, portable feed for making presses easily adaptable to single or continuous operation has been announced by E. W. Bliss.

Available on new presses only, it can be used as a conventional, single roll feed for continuous feeding or, by simply removing two bolts, it can be swung away from its normal position to permit single trip hand feeding.



The feed can handle 0.125 in. stock up to 8 in. wide. It has a feed length of 0 to 8 in. and a feed height of 2 to 4½ in.

For further information, *write* Press Div., E. W. Bliss Co., 1004 E. State St., Hastings, Mich.

500 Watt Generator Runs Ultrasonic Degreaser

AN ULTRASONIC vapor degreaser introduced by Westinghouse is powered by a solid state, 500 watt generator with Magnatrak automatic tuning.

The unit (made of stainless steel) contains a boiling compartment to remove gross contaminants from metal parts and an ultrasonic compartment for final cleaning. Heating capacity is 2000 watts. The boiling and ultrasonic sumps both measure 11 in. long, 14 in. wide, and 8 in. deep. Larger or smaller sizes are available. Outside dimen-

BETTER WELDING THROUGH ARCOS SERVICE

Technical assistance from Arcos will help you get the most economical and efficient application of weld metal. By training and experience, your Arcos representative is the man to bring you on-the-job assistance—when and where you need it—backed up by an Arcos team of technicians, researchers, metallurgists and engineers. Depend on your Arcos representative to supply you with the right filler metal for your job. For better welding call on Arcos technical service.

ARCOS

Arcos Corporation • 1500 S. 50th St. • Philadelphia 43, Pa.

EASY DOES IT . . . and it's easy to do with CF&I-Wickwire Swing Sling. Here, workmen at the Norton Company in Worcester, Massachusetts provide finger-tip control while transporting a 12-ton pulpstone to further finishing operations.

How Norton Company babies 12-ton pulpstones in a 30-foot Swing Sling* cradle

"Our customers are entitled to receive the product they buy in perfect condition," says Lester Knapp, foreman of the pulpstone assembly operation at Norton. When the product is a 12-ton pulpstone for the paper industry, carrying it with care is no easy matter. That's why Mr. Knapp is an enthusiastic booster of CF&I-Wickwire's Swing Sling.

"Because of the neoprene covering over the wire strands," reports Mr. Knapp, "there is no possibility of damaging the surface. Swing Slings have simplified and increased the efficiency of our materials handling system every step of the way."

Mr. Knapp is not alone in his praise for the Swing Sling. An ever-increasing number of men concerned with materials handling are finding that the Swing Sling is the long awaited answer to their problem. Swing Sling's exclusive neoprene blocks grip the load gently, lift it firmly . . . without damage to even the most easily-marred surfaces.

There's sure to be a Swing Sling to meet your specific requirements. For complete details, contact your CF&I-Wickwire sales office or distributor.

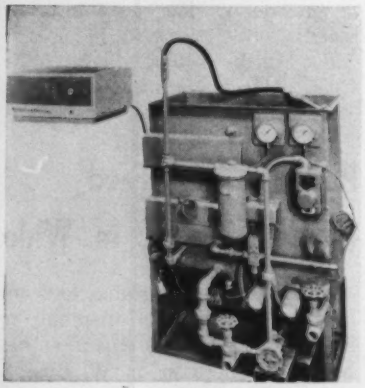
*Trademark—Patent Pending

8401

The Colorado Fuel and Iron Corporation
Denver • Oakland • New York
Sales Offices in Key Cities

CF&I STEEL MADE IN U.S.A.

NEW PRODUCTS and equipment



sions of the unit: 28 in. long, 20 in. wide, and 23 in. high. Optional equipment is available.

For further information, *write* Industrial Electronics Dept., Westinghouse Electric Corp., 2519 Wilkens Ave., Baltimore 3, Md.

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...And A Real
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◀ Shown here loading packaged coils of steel strip is Elpar's electrically-powered R-12 "Titan" Series fork truck. With a capacity of 20,000 lbs., it's part of a formidable materials handling team made by The Elwell-Parker Electric Co., producers of battery-powered trucks such as the RION "Hercules" Series with capacities up to 100,000 lbs.

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NEW Literature

Write directly to the company for a copy

Jig and Fixture Chart

A conversion chart lists identical jig and fixture components made by 12 companies. Northwestern Tools Inc., 117 Hollier Ave., Dayton 3, Ohio.

Technical Bulletin

Vol. II, No. 1 of the Engelhard technical bulletin presents a discussion of the production of pure nitrogen from nitric acid tail gas through a platinum metal catalytic process, production of pure commercial hydrogen, hydrogenation of tall oil with platinum metal catalysts, and a furnace for high temperature thermocouple calibration. The bulletin also contains abstracts of recently issued patents on platinum metals and gold. Technical Service Dept., Engelhard Industries Inc., 75 Austin St., Newark 2, N. J.

Electric Welding Library

A collection of technical papers contains process and application details on short arcwelding, Mig and Tig welding and spotwelding, submerged arcwelding, CO_2 flux arcwelding, and plasma arc cutting, welding, and weld surfacing. Linde Co., a division of Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

NEW BOOKS

Standard Sizes of Oil-Hardenable Flat, Ground Tool Steel Stock, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., 10 cents

The list, recommended by industry, presents a simplified selection of 332 standard items (previously 700) that are said to provide an adequate selection for all ordinary needs (90 per cent or more of sales volume). The Commodity Standards Division adds that the reduction in variety of sizes recommended in the new standard will enable the trade to concentrate its services on the most useful items and avoid superfluous or special items.

Tool Steel Simplified, revised third edition, Frank R. Palmer and George V. Luerssen, Carpenter Steel Co., Reading, Pa., 595 pages, $2.50

Here's a simplified approach to selecting and heat treating tool steels. An introduction to terminology and a general background is covered in the first several chapters. Chapters 6 through 15 describe simplified selection and heat treatment. Chapter 16 presents an interesting angle on tool design, Chapters 17 and 18 give rules for hot acid etching, timbre, and hardenability testing, Chapter 19 tells how to identify steels by emery sparks, Chapters 20, 21, and 22 discuss furnace atmosphere, heating time, and quenching, and Chapter 23 contains practical tips on troubleshooting.

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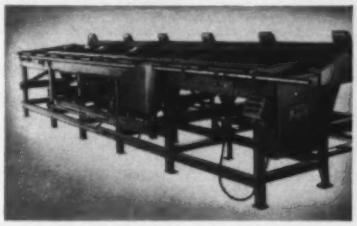

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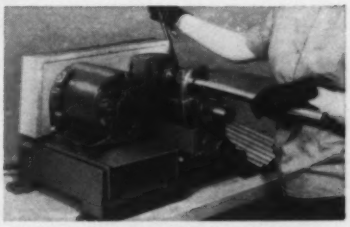

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- Hot Rolled Sheets
- Hot Rolled Pickled Sheets
- Cold Rolled Steel in Coil *(full hard only)*
- Cold Rolled Sheets
- Alloy Sheets and Plates
- Plates (5/16" *and lighter*)
- Electrical Sheets
- Electric Weld Line Pipe
- Spiral Welded Pipe

Acme-Newport Steel COMPANY

NEWPORT, KENTUCKY

A SUBSIDIARY OF ACME STEEL COMPANY

Recovery Gaining Momentum

THIRD QUARTER steel production is shaping up better than expected. Barring a strike in the automotive industry, it will be the largest of any three month period since the first quarter of 1960.

Steelmaking operations will average about 71 per cent of 1960 capacity. Production will be about 26.4 million ingot tons (vs. 25.1 million in the second quarter and 19.7 million in the first).

UNFORESEEN SUPPORT—In July, most analysts would have settled for a 25-million-ton third quarter. They expected consumption to drop as fabricators closed their plants for vacations and automakers shut down for model changeovers. But buying didn't fall as much as they feared. Users had to keep ordering to sustain even limited production because their inventories were abnormally low. As the vacation season ended, sales picked up. Reduced automotive consumption was offset by increased demand from the construction industry, appliance manufacturers, and miscellaneous users whose inventories weren't big enough to support the higher levels of production that they were planning. Result: Steel production spurted from 8.1 million ingot tons in July to 8.7 million tons in August.

UPTURN GAINS MOMENTUM— This month, production will climb still higher. If there's no automotive strike (or one that doesn't last more than a few days), ingot output will be close to 9.6 million tons—the largest of any month since April, 1960. Automakers are planning to build about 500,000 cars this month (vs. 195,000 in August and 408,000 last September.)

STAINLESS BRIGHTENS— Although the threat of an auto industry strike is holding demand for carbon steel sheets in check—it's causing automakers to defer shipments and delay placing orders—there's new strength elsewhere in the flat rolled steel market. Take stainless strip. Producers report that their August shipments were 40 to 50 per cent higher than July's. At some mills, orders booked in August were 100 per cent above the previous month's.

OIL COUNTRY REVIVES—There's new strength in tubular products, too. Oil country goods are booming again. August was the best month for shipments and incoming orders since March, 1960. The upturn reflects increased drilling activity in the U. S. and Canada. To a lesser extent, it may also reflect a special circumstance: Buyers in Texas probably ordered some pipe in August that they would not have bought until September if the state hadn't announced that it would collect a 2 per cent sales tax after Aug. 31.

STRONG FOURTH QUARTER—Steelmaking operations will average about 78 per cent of capacity in the fourth quarter. Production will be close to 29 million ingot tons—pushing the year's output to 100 million tons. Marketing men are optimistic because they foresee: 1. Production of 1.8 million cars (highest for a fourth quarter since 1955). 2. Continued improvement in the economy. 3. Increased government spending for defense. 4. Moderate inventory building.

OUTPUT EDGES UP—Look for ingot production in the week ending Sept. 16 to be slightly higher than the 2,050,000 tons that STEEL estimates the industry poured in the week ended Sept. 9. Output then was 1 per cent above the previous week's.

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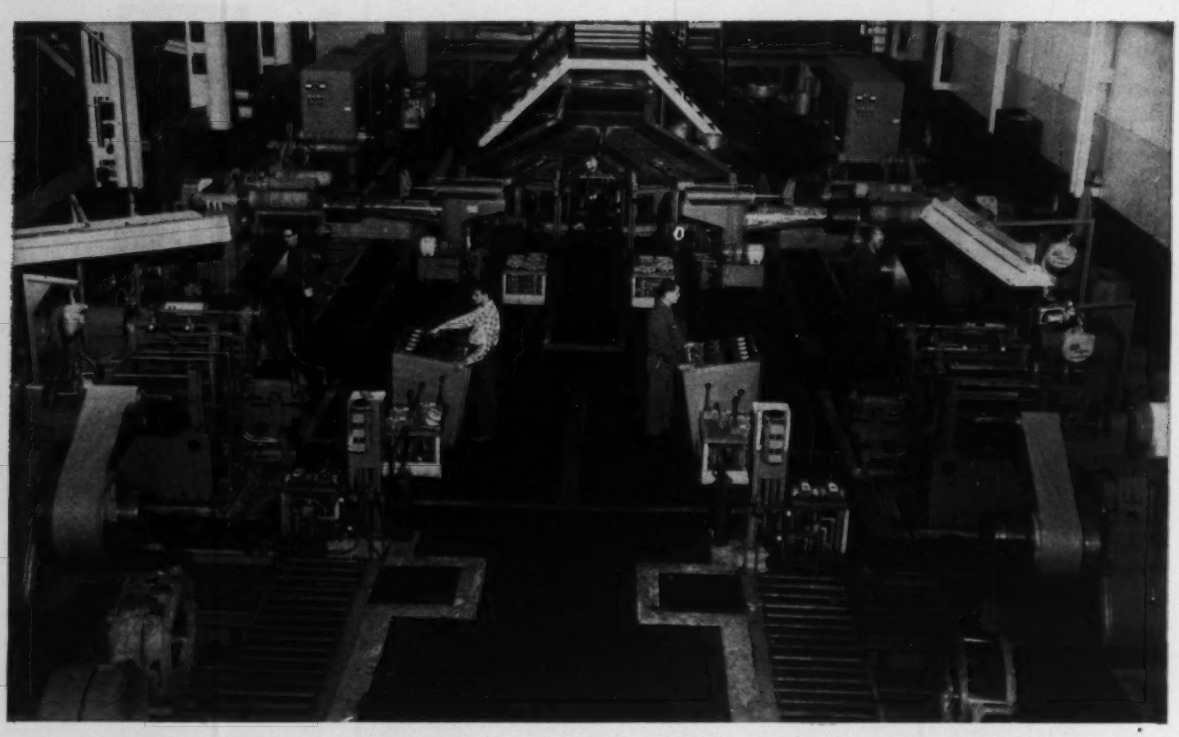
*Current prices were published in the Sept. 4 issue and will appear in subsequent issues.



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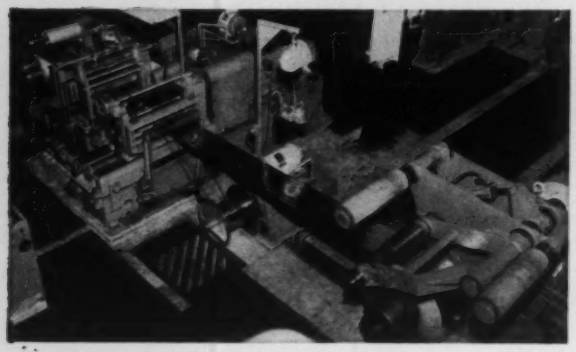

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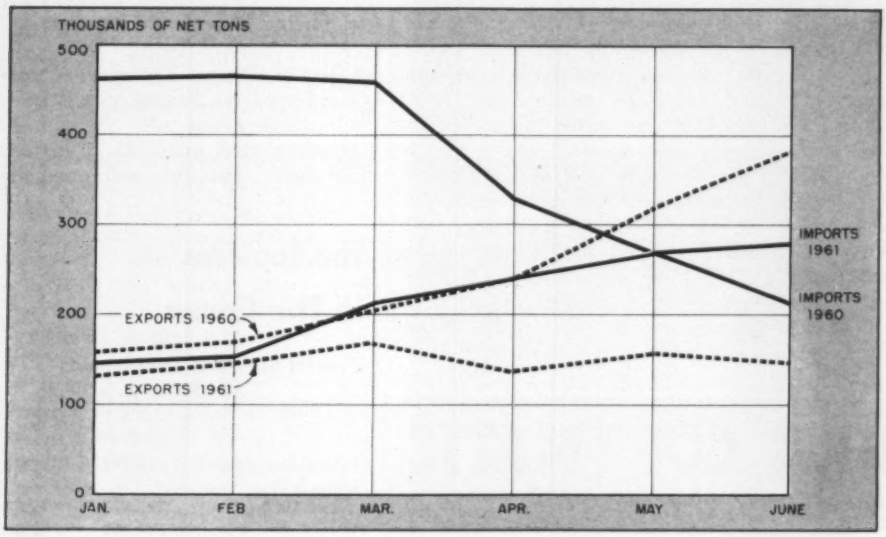


First Half Totals
(Net tons)

IMPORTS

1961 . . .	1,286,074
1960 . . .	2,195,657

EXPORTS

1961 . . .	890,202
1960 . . .	1,465,277

Steel Import-Export Gap Widens

IF U. S. imports of steel in the second half equal those of the first half, the year's total will be the third largest recorded for this country.

Only two years—1959 and 1960—would be higher. Domestic steel was scarce in both of those periods because of a 116 day steelworkers' strike in the last half of 1959.

Steel imports into the U. S. in the first half of this year were at an annual rate of about 2,570,000 net tons. In 1959, the total was 4,356,987 tons; in 1960, 3,333,127 tons. Imports in the first half of 1961 were equal to 4 per cent of the total new supply of steel available in the U. S.

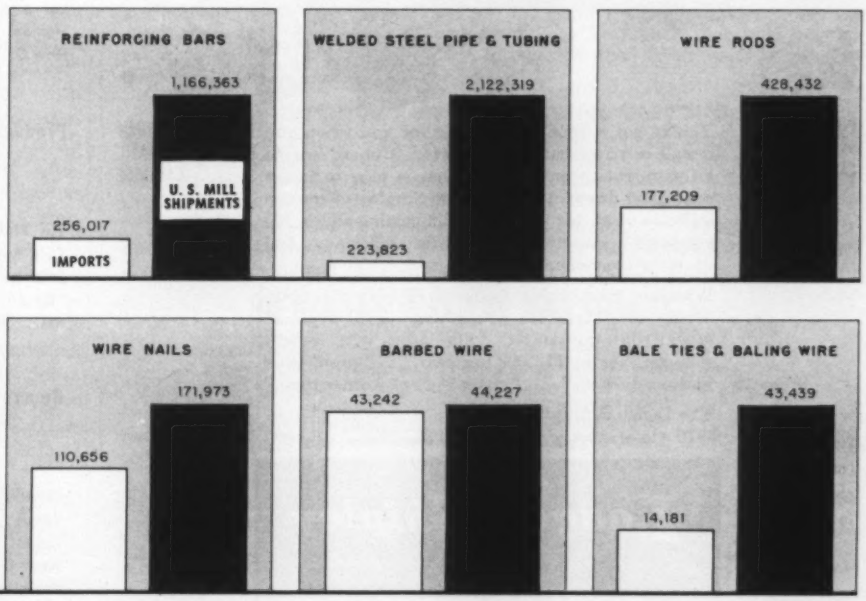
• **Steady Climb**—Each month in this year's first half saw imports climb. In June, they were at an annual rate of 3,328,000 tons.

At the same time, exports trended downward. If second half exports approximate those of the first half, the year's total will be around 1,800,000 tons—with the exception of 1959's 1,676,652 tons, it would be the poorest showing since 1938.

• **Ahead Dollarwise**—Although export trade in the first half was un-

How Some Steel Imports Compare With Domestic Mill Shipments

(First half, 1961—Net tons)



favorable tonnagewise, it was favorable dollarwise. The 890,202 tons of mill products exported were valued at $197,958,554 compared with 1,286,074 tons of imports valued at $161,330,851. The value of exports averaged $222 a ton vs. $126 for imports.

That difference springs from several factors: Imported products are largely the less sophisticated ones (like reinforcing bars); and prices of foreign producers are lower than those of their counterparts in the U. S. In contrast, our exports are weighted heavily with the more sophisticated products (like tin plate and cold rolled sheets), and U. S. products are priced higher than those made abroad.

For example, the leading import is reinforcing bars (they comprise 20 per cent of the imports of mill products), and the leading export is tin plate (it constitutes 22 per cent of steel exports). The U. S. base price for one grade of tin plate is $68.50 a ton above that for reinforcing bars of foreign origin.

• **Top in Rebars**—The main source of imported reinforcing bars is Belgium-Luxembourg, also the No. 1 shipper of steel to the U. S. in the first half. Fifty-one and one-half

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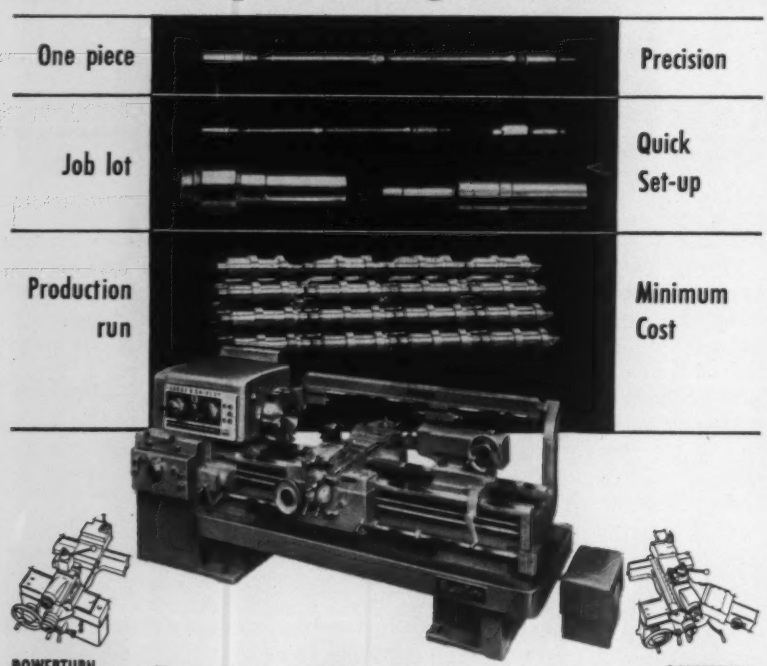

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your Lodge-ical choice in lathes...

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The Top Five In Five Groups

Product Groups of Steel Imports
First Half, 1961

	Net Tons	Percentage Of Total Imports
Reinforcing Bars	256,017	19.9
Welded Pipe and Tubing	223,823	17.4
Wire Rods	177,209	13.8
Wire Nails	110,656	8.6
Structural Shapes	108,006	8.4

Suppliers of Steel to U. S.
First Half, 1961

	Net Tons	Percentage Of Total Imports
Belgium-Luxembourg	443,286	34.5
Japan	275,485	21.4
West Germany	187,043	14.5
France	139,099	10.8
Canada	71,038	5.5

Port Areas for Steel Imports
First Half, 1961

	Net Tons	Percentage Of Total Imports
Galveston	245,383	19.1
New York	152,230	11.8
Los Angeles	133,411	10.4
Florida	103,150	8.0
New Orleans	73,155	5.7

Product Groups of Steel Exports
First Half, 1961

	Net Tons	Percentage Of Total Exports
Tin Plate	196,716	22.1
Cold Rolled Sheets	124,355	14.0
Structural Shapes	111,923	12.6
Plates	47,554	5.3
Rails (heavy)	42,950	4.8

Buyers of Steel from U. S.
First Half, 1961

	Net Tons	Percentage Of Total Exports
Canada	217,486	24.4
Brazil	51,866	5.8
Italy	47,391	5.3
West Germany	42,721	4.8
Pakistan	41,937	4.7

per cent of all rebars imported into the U. S. came from Belgium-Luxembourg, which supplied 131,993 tons. That was equivalent to 29.8 per cent of the total steel shipped by Belgium-Luxembourg to the U. S.

Although tin plate was the leading steel mill export from the U. S., the No. 1 export market (Canada) was not the No. 1 taker of this product. The biggest outlet for tin plate was Brazil. The leading product shipped to Canada was structural shapes.

• **Japan Is Second**—Japan, now the second largest supplier to the U. S., increased its grip on its position. In all of 1960, Japan provided 17.9 per cent of the steel imports into the U. S. In the first half of 1961, it accounted for 21.4 per cent. Japan came up quickly to the No. 2 spot. As late as 1957, it furnished only 2.7 per cent of the U. S. imports of steel. Japan displaced West Germany, now in third place.

Canada, fifth largest supplier of steel to the U. S., is the largest buyer of steel from the U. S. Similarly, West Germany, third as a steel shipper to the U. S., is fourth as a buyer.

Most Steel Users Buying On Minimum Leadtimes

Government pressure on the steelmakers to forego price increases this fall despite higher labor costs, is resulting in some slackening of hedge buying. Such buying has not been particularly active, however. Some consumers are placing protective orders while they still have time. They think producers will boost prices if market conditions appear at all favorable. Advances may be selective, and not as much as the mills might think warranted in offsetting higher costs, but still sufficiently high and general to make some hedging desirable.

Most consumers are placing business on almost minimum leadtime. They are likely to continue doing so as long as the mills can give quick deliveries. Typical of deliveries are the promises of Inland Steel Co., Chicago:

Universal mill plates and 24 in. mill flats, one to two weeks; safety plates, sheared plates, cold rolled sheets and coils, electrical sheets

SUNBEAM electric heater cases get uniform finish with RANSBURG electrostatic. . . . 6 times as many per gallon of paint—15 times faster.

"Paint Mileage Leaps 500%.... Production Upped 15 Times" Reports ENAMELED STEEL & SIGN CO.

Curt Simmons, President, ENAMELED STEEL & SIGN COMPANY of Chicago, describes results with RANSBURG Automatic No. 2 Process Electro-Spray: "We first painted cases for the new SUNBEAM portable electric heaters with air hand spray at the rate of 200 pieces per day using 6 gallons of paint. Now, with RANSBURG electrostatic we've increased production 1400% to 3000 pieces daily with only 15 gallons of paint." An increase of 500% in paint mileage! *What would savings like this mean in your finishing department?*

QUALITY IMPROVED WITH RANSBURG ELECTRO-SPRAY

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ENAMELED STEEL—sold on the efficiency and versatility of RANSBURG Electro-Spray—uses 14 automatic No. 2 Process units to meet the heavy demands of their diversified, high volume production.

NO REASON WHY YOU CAN'T DO IT TOO

Manufacturers—large and small—are reporting similar savings in paint and labor with increased production. If your volume doesn't justify automatic electrostatic equipment, perhaps the RANSBURG electrostatic hand gun will help cut costs in your finishing operation. Write for our new brochure showing actual in-plant production photos, savings figures and detailed information on RANSBURG No. 2 Process Electro-Spray.

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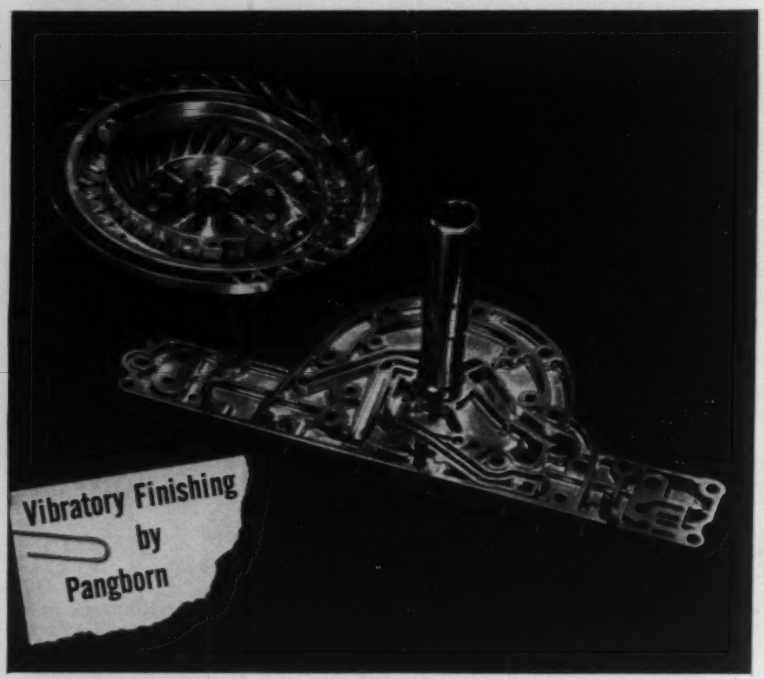
and coils, and enameling iron sheets, three to four weeks; hot rolled sheets and coils, hot rolled pickled sheets and coils, hot rolled strip, and hot rolled pickled strip, two to three weeks; galvanized sheets, coils and culvert sheets, mid-to-late October; electrolytic tin plate sheets and coils, black plate, and blue plate, October.

Wire . . .

Wire Prices, Pages 146 & 147

Wire products are moving at a little faster pace, particularly the industrial grades, but order volume continues disappointing. Imports hold down domestic sales. Spring wire demand is more active on automotive and furniture accounts.

Low carbon wire is meeting sustained competition from imported material. High carbon specialties are a less important factor in imports—specialties made of Swedish steel have shared in the market for many years without any particular dislocation resulting.



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What's more, the Pangborn Vibratory Finishing Machine performs as much as 100 times faster than conventional equipment. Cuts costs? You bet!

All sizes of the machine come equipped with variable speeds and amplitudes plus new improved air-cushioned suspension. Optional air-cushioned floor mounts completely eliminate any transmission of vibration to the floor. Auxiliary equipment and the best in media and compounds are available for your every need. Send parts with exact finish specifications or finished specimen for sample processing in our laboratory to Mr. William E. Brandt at:

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Pangborn
OF HAGERSTOWN

Plates . . .

Plate Prices, Page 144

Orders for plates, which have lagged demand for most other major steel products, are beginning to show improvement. While no sharp spurt from any one consuming line is reported, pipeline and shipwork are increasing, and tonnage needs for tank and pressure vessels are gaining.

In general, railroad requirements are developing slowly. However, demand from this area of the market is also a little stronger.

Working against any sharp increase in forward buying is the fact that prompt deliveries are available. Sheared plates can still be had within two to three weeks. However, one leading producer now has little tonnage to offer for shipment under four to five weeks.

Several subcontracts for heavy plate work for the Portsmouth (N. H.) Navy Yard have been withdrawn. They include rudders, tanks, and torpedo handling assemblies for submarines. The work will be done at the yard.

Steel Bars . . .

Bar Prices, Page 144

The market situation in carbon steel bars is spotty. In general, demand is a shade better than it has been in recent weeks. Deliveries on hot rolled range two to four weeks, but cold drawn stock is still available from inventory.

Cold finished bar sellers report a moderate upswing in demand. August shipments bettered those in July, but September bookings are disappointing. Automotive suppliers are holding their orders back.

Cutting extras on bars 5 ft and longer have been eliminated by most producers. There had been some overstocking. Service centers are thought to be waiving cutting extras on larger orders in spite of waste problems. They're in active competition with the mills for orders of 4000 lb (not 400 lb as erroneously reported in STEEL Aug. 28, p. 102, due to a typographical mistake). Since distributors usually stock bars in 12 ft lengths, there's some question about the economics of filling a customer order for bars 7½ ft long. What's to be done with the 4½ ft leftover?

Inland Steel Executive Predicts Late Year Gains

Sharp improvement in business is expected to make the fourth quarter the best three months of the year, predicts Robert M. Buddington, sales vice president, Inland Steel Co., Chicago. He reports that Inland's volume of orders received during the first half of August indicated the month's business will be close to May's, which had been the best this year to date.

Mr. Buddington said Inland is basing its outlook on several factors: 1. General business is improving. 2. Customers are checking their inventories in light of increasing production schedules. 3. The normal seasonal uptrend is bringing a natural recovery in some manufacturing lines. 4. The tense international situation may stimulate buying. 5. A good automotive year in 1962 is predicted. 6. Service centers may step up their buying.

Inland's production rate has recovered to the level of May-June, the two best months of the year.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 145 & 146

Demand for flat rolled steel is better, but the automotive industry holds the key to buying and consumption the rest of the year.

Automotive requirements have been limited for weeks, and the resumption of active demand awaits new labor contracts in the industry. It's thought there'll be considerable buying by the carmakers if contracts are negotiated without a strike. Some auto steel has been ordered but deliveries have been held up. The autobuilders are thought to have enough steel on hand to get into good production on their 1962 models.

Mill deliveries on hot rolled sheets range two to three weeks and on cold rolled three to five. Some mills offer galvanized sheets for mid-October shipment, but others are booked full for that month.

Tubular Goods . . .

Tubular Goods Prices, Page 148

August was the best month for shipments and incoming orders of oil country goods since March, 1960. One mill told STEEL its August shipments were almost 50 per cent higher than the previous month's. A larger producer reported a gain of 10 to 15 per cent.

The upturn reflects active oil drilling in the U. S. and Canada. Active rotary drilling rigs in the U. S. in the latest week of record totaled 1838, down 24 from the preceding week's count. User inventories of drill pipe, tubing, and casing are low.

To a lesser extent, increased oil country goods demand may reflect special circumstances. For example, some Texas buyers probably ordered pipe in August that they might have bought in September if the state hadn't announced it would collect a 2 per cent sales tax after Aug. 31.

Price hedging may be a factor this month. Some customers are showing interest in the date of the next steel wage increase. With operations the highest in over a year—20 turns a week at some mills—deliveries are a little slower.

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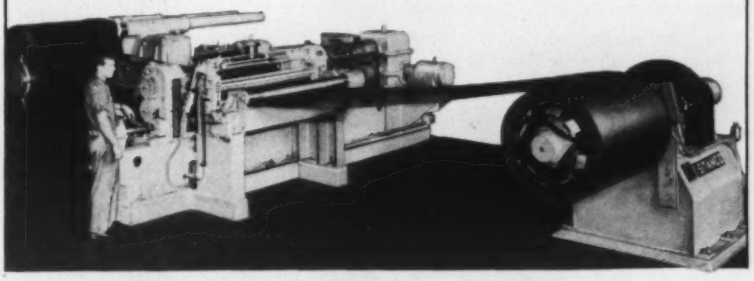

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Big 1962 Gains Predicted For Western Steel Market

Receipts by steel consumers in the Western market (comprising California, Washington, Oregon, Utah, Arizona, Nevada, and Idaho) in 1961 should closely approach 1960 volume, 6,270,000 net tons, reports Kaiser Steel Corp., Oakland, Calif., in its annual "Report to Far Western Steel Purchasers."

Several factors bolster the outlook for 1962, including the prospects for increased capital spending and bigger defense requirements.

Western market volume in 1960 was up 1 per cent from that in 1959, the report states. Receipts by consumers during the year were 6,270,000 tons vs. 6,216,000 in 1959.

Distribution within the seven-state region shows that California consumers accounted for almost three-quarters of the tonnage. Some 41 per cent went to Southern California, 33 per cent to Northern California. Oregon and Washington accounted for 14 per cent, and the balance went to the four remaining states.

Distributors . . .

Prices, Page 149

Bookings by steel service centers rose about 5 per cent last month and distributors anticipate a further, but modest, gain this month. Trading is still far from brisk.

Although inventories generally are adequate, some distributors plan to step up their purchases as a hedge against an indicated lengthening of delivery schedules.

The market is strongly competitive pricewise, especially in those areas where imported steel offerings are large. Foreign steel brokers in the Southwest are faring well. Most tonnages bought for future delivery are being sold before the cargoes arrive.

Pig Iron . . .

Pig Iron Prices, Page 149

Merchant pig iron demand is gaining slowly. Consumers are buying hand to mouth and are not expected to enter the market more actively until late this month. Demand for export tonnages from Buffalo continues.

Producers are increasing production steadily. Bethlehem Steel Co. has blown in another blast furnace at Lackawanna and is operating five of its seven units there. The Buffalo plant of Republic Steel Corp. took off a stack because of slow merchant iron demand.

In Youngstown, ten blast furnaces are in operation, the highest level since the spring of 1960.

July's Pig Iron Output Slightly Below June's

Pig iron production slipped a little in July, totaling 5,597,352 net tons vs. 5,687,134 in June, reports the American Iron & Steel Institute. Output topped the 4,480,144 tons produced in July, 1960, by a substantial margin.

Of the total production in the month, 289,046 tons were low phos, intermediate low phos, and bessemer grade; 5,043,630 tons were basic; 164,272 tons malleable and silvery; 100,404 foundry.

Output in the first seven months this year amounted to 34,103,598 tons: Low phos, 1,541,512; basic, 30,688,595; malleable and silvery, 1,136,663; foundry, 736,828. Production in the like period last year totaled 45,645,176 tons: Low phos, 2,750,468 tons; basic, 40,036,107; malleable and silvery, 1,962,505; foundry, 896,096.

Merchant iron shipments in July amounted to 301,097 tons against 345,701 in June and 240,412 in July, 1960.

Iron Ore Stocks Rise in July Despite Greater Use

Stocks of iron ore (U. S. and Canada) increased in July, rising to 65,941,676 gross tons vs. 61,295,843 in June and 63,633,110 in July, 1960, reports the American Iron Ore Association. At the same time, consumption rose during the month, amounting to 9,180,555 tons against 9,139,606 the preceding month and 7,513,324 tons in July last year.

Consumption in the first seven months of this year totaled 55,718,156 tons vs. 74,154,895 in the same period a year ago. Of the total, 51,709,135 tons were consumed in the U. S. and 4,009,021 in Canada. Last year, U. S. consumption in the pe-

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riod was 70,228,774 tons, Canadian, 3,926,121.

Foreign ore stocks held at the end of July totaled 18,727,304 tons vs. 16,458,504 at the end of July 1960. U. S. Lake Superior ore stocks amounted to 37,416,150 vs. 36,171,627 a year ago.

Iron Ore . . .

Iron Ore Prices, Page 150

Shipments of Lake Superior iron ore in August totaled 9,929,110 tons, a decrease of 135,588 tons from the 10,064,698 tons moved in the same month a year ago, reports the American Iron Ore Association. Shipments in the 1962 season to Sept. 1 amounted to 34,088,064 tons, down 18,222,593 tons from the 52,310,657 tons moved to Sept. 1 in the 1960 lake shipping season.

Shipments of Barrels and Drums Hold Fairly Steady

Shipments of steel shipping barrels and drums in June totaled 2,823,567 units, practically unchanged from May's 2,810,812, reports the Census Bureau. In June, 1960, producers shipped 2,815,607 units. The total for the first six months this year was 15,571,368 units vs. 15,245,491 in the like period last year.

Steel pail shipments in June amounted to 7,498,634, up 6 per cent from May's 7,096,949, and 4 per cent from the 7,197,979 units shipped in June, 1960.

Steel Ingot Output Rises For Sixth Straight Week

STEEL ingot output increased in the week ended Sept. 9 to an estimated 2,050,000 tons from 2,030,000 tons the preceding week. Most mills maintained steelmaking operations over Labor Day, but suspended most finishing operations. The gain registered last week was the sixth consecutive one and the uptrend is expected to gain momentum the next several weeks, barring an interruption of automotive output.

• **Youngstown** — The operating rate here advanced 3 points in the week ended Sept. 9 to 66 per cent of 1960 capacity. Production is the heaviest since the spring of 1960.

• **Chicago**—Steelmaking operations were scheduled at 74 per cent of 1960 capacity for the week ended Sept. 9, a gain of 1 point over the previous week's rate. Current ingot production includes some inventory building of semifinished.

• **Buffalo** — Production has forged ahead again with the lighting of another open hearth at the Lackawanna, N. Y., plant of Bethlehem Steel Co. Bethlehem may reactivate its No. 1 open hearth plant which has 14 open hearths and has been completely closed. The company is operating 18 of its 35 open hearths and may add seven more this month.

• **Philadelphia** — Output in the Northeastern district dipped slightly during the week ended Sept. 9, reflecting Labor Day influences.

• **Birmingham** — The steelmaking rate for the Birmingham-Gadsden-Atlanta area of the Southern district rose 3 points during the week ended Sept. 9 to 69.5 per cent of 1960 capacity.

• **San Francisco** — The Labor Day holiday slowed steel production in the week ended Sept. 9 but operations are resuming their strong uptrend.

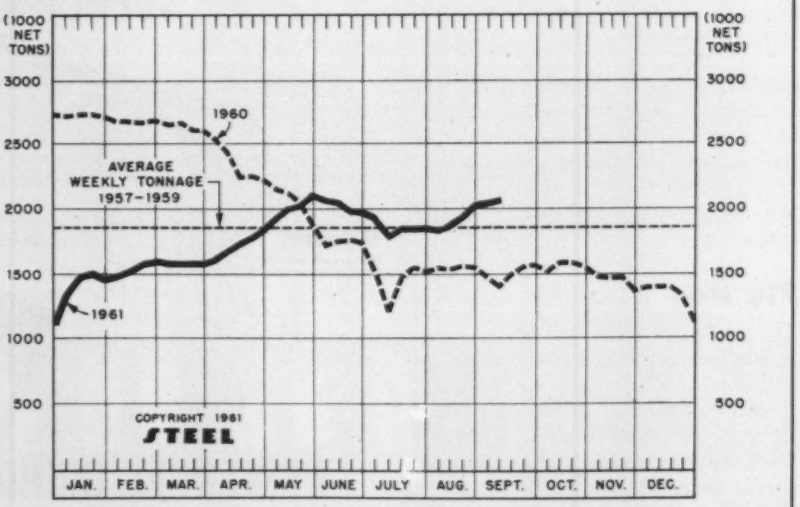
• **Cleveland** — Steelmaking operations continue to rise here. Output is expected to soon equal the year's high of 116,670 tons. The tonnage for the week ended Sept. 2, the latest official figure, is 113,892 tons.

STEEL INGOT PRODUCTION

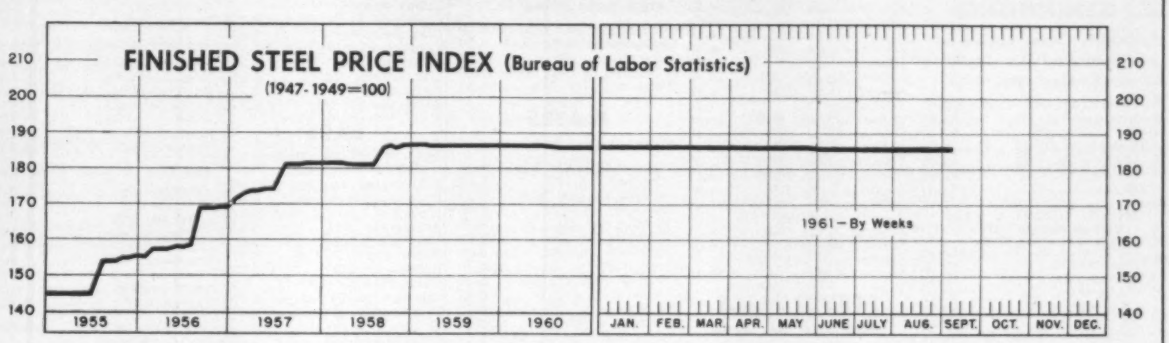
Weeks Ended	Net Tons	Change
Sept. 9	2,050,000*	+ 1.0%
Sept. 2	2,030,000	+ 0.5%
Aug. 26	2,020,000	+ 3.9%
Totals to Sept. 2		
1961	62,140,000	−15.8%
1960	73,785,000	

DISTRICTS	Week Ended Sept. 2 Tons‡	Index†	Week Ended Aug. 26 Index†
Northeastern	304,603	114	116
Buffalo	93,461	96	93
Pittsburgh	406,221	101	97
Youngstown	156,383	92	96
Cleveland	113,892	123	119
Detroit	138,490	132	134
Chicago	404,002	108	109
Cincinnati	89,732	119	114
St. Louis	62,535	119	125
Southern	120,320	111	111
Western	137,957	118	117
Industry	2,030,000	109.0	108.4

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Sept. 5, 1961	Week Ago	Month Ago	Aug. Index	Year Ago
185.6	185.6	185.6	185.6	186.2

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Sept. 5

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	(N.A.)
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.643
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.225
Strip, C.R., Stainless, 430 (lb)	0.460
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.495
Pipe, Galv., Buttweld (100 ft)	23.098
Pipe Line (100 ft)	195.423
Casing, Oil Well, Carbon (100 ft)	193.028
Casing, Oil Well, Alloy (100 ft)	302.645
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	192.285
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (Bundles)	7.647
Nails, Wire, 8d Common	9.433
Wire, Barbed (80-rod spool)	8.372
Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Sept. 6 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg = 100)	247.82	247.82	247.82	247.82	225.71
Index in cents per lb	6.713	6.713	6.713	6.713	6.114

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$137.75
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	62.63
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	62.18
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	63.41
Steelmaking Scrap, GT	39.50	38.67	38.00	32.33	58.83

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Sept. 6 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	5.075
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	5.075
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.85
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	5.00
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	5.00
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.85
Plates, Chicago	5.30	5.30	5.30	5.30	4.85
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	5.25
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.85
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.75-5.85
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	6.30
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.95
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	7.20
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	8.35
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.85

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$91.50
Wire rods, $\frac{7}{32}$-$\frac{1}{2}$" Pitts.	6.40	6.40	6.40	6.40	5.80

PIG IRON, Gross Ton	Sept. 6 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$63.50
Basic, Valley	66.00	66.00	66.00	66.00	62.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	66.26
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	66.76
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	59.00
No. 2 Fdry(Birm.),deld.,Cin.	70.20	70.20	70.20	70.20	66.70
Malleable, Valley	66.50	66.50	66.50	66.50	63.00
Malleable, Chicago	66.50	66.50	66.50	66.50	63.00
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	215.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$37.50	$35.50	$35.50	$30.50	$58.50
No. 1 Heavy Melt, E. Pa.	40.50	40.00	40.00	35.00	59.00
No. 1 Heavy Melt, Chicago	40.50	40.50	38.50	31.50	59.00
No. 1 Heavy Melt, Valley	41.50	39.50	38.50	33.50	65.50
No. 1 Heavy Melt, Cleve.	38.50	36.50	36.50	31.50	63.00
No. 1 Heavy Melt, Buffalo	31.50	31.50	31.50	29.50	56.50
Rails, Rerolling, Chicago	61.50	60.50	58.50	53.50	84.50
No. 1 Cast, Chicago	43.50	42.50	42.50	40.50	53.50

COKE, Net Ton					
Beehive, Furn., Connisvl.	$15.00	$15.00	$15.00	$15.00	$14.50
Beehive, Fdry., Connisvl.	18.25	18.25	18.25	18.25	17.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	29.50

Steel Prices

Mill base prices as reported to STEEL, Sept. 6, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 145; footnotes, page 147.

SEMIFINISHED

INGOTS, Carbon Forging (NT)

Munhall,Pa. U5 ..... $76.00

INGOT, Alloy (NT)

Detroit S41 ..... $82.00
Economy,Pa. B14 ..... 82.00
Farrell,Pa. S3 ..... 82.00
Lowellville,O. S3 ..... 82.00
Midland,Pa. C18 ..... 82.00
Munhall,Pa. U5 ..... 82.00
Sharon,Pa. S3 ..... 82.00

BILLETS, BLOOMS & SLABS Carbon Rolling (NT)

Bartonville,Ill. K4 ..... $82.00
Bessemer,Pa. U5 ..... 80.00
Buffalo R2 ..... 80.00
Clairton,Pa. U5 ..... 80.00
Ensley,Ala. T2 ..... 80.00
Fairfield,Ala. T2 ..... 80.00
Fontana,Calif. K1 ..... 90.50
Gary,Ind. U5 ..... 80.00
Johnstown,Pa. B2 ..... 80.00
Lackawanna,N.Y. B2 ..... 80.00
Munhall,Pa. U5 ..... 80.00
Owensboro,Ky. G8 ..... 80.00
S.Chicago,Ill. R2, U5 ..... 80.00
S.Duquesne,Pa. U5 ..... 80.00
Sterling,Ill. N15 ..... 80.00
Youngstown R2 ..... 80.00

Carbon, Forging (NT)

Bessemer,Pa. U5 ..... $99.50
Buffalo R2 ..... 99.50
Canton,O. R2 ..... 102.00
Clairton,Pa. U5 ..... 99.50
Conshohocken,Pa. A3 ..... 99.50
Ensley,Ala. T2 ..... 99.50
Fairfield,Ala. T2 ..... 99.50
Farrell,Pa. S3 ..... 99.50
Fontana,Calif. K1 ..... 109.00
Gary,Ind. U5 ..... 99.50
Geneva,Utah C11 ..... 99.50
Houston S5 ..... 104.50
Johnstown,Pa. B2 ..... 99.50
Lackawanna,N.Y. B2 ..... 99.50
LosAngeles B3 ..... 109.00
Midland,Pa. C18 ..... 99.50
Munhall,Pa. U5 ..... 99.50
Owensboro,Ky. C8 ..... 99.50
Seattle B3 ..... 109.00
Sharon,Pa. S3 ..... 99.50
S.Chicago R2, U5, W14 ..... 99.50
S.Duquesne,Pa. U5 ..... 99.50
S.SanFrancisco B3 ..... 109.00
Warren,O. C17 ..... 99.50

Alloy, Forging (NT)

Bethlehem,Pa. B2 ..... $119.00
Bridgeport,Conn. C32 ..... 119.00
Buffalo R2 ..... 119.00
Canton,O. R2, T7 ..... 119.00
Conshohocken,Pa. A3 ..... 121.00
Detroit S41 ..... 119.00
Economy,Pa. B14 ..... 119.00
Farrell,Pa. S3 ..... 119.00
Fontana,Calif. K1 ..... 140.00
Gary,Ind. U5 ..... 119.00
Houston S5 ..... 124.00
Ind.Harbor,Ind. Y1 ..... 119.00
Johnstown,Pa. B2 ..... 119.00
Lackawanna,N.Y. B2 ..... 119.00
LosAngeles B3 ..... 139.00
Lowellville,O. S3 ..... 119.00
Massillon,O. R2 ..... 119.00
Midland,Pa. C18 ..... 119.00
Munhall,Pa. U5 ..... 119.00
Owensboro,Ky. G8 ..... 119.00
Seattle(6) B3 ..... 140.00
Sharon,Pa. S3 ..... 119.00
S.Chicago R2,U5,W14 ..... 119.00
S.Duquesne,Pa. U5 ..... 119.00
Struthers,O. Y1 ..... 119.00
Warren,O. C17 ..... 119.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 ..... $122.50
Canton,O. R2 ..... 125.00
Cleveland R2 ..... 122.50
Gary,Ind. U5 ..... 122.50
S.Chicago,Ill. R2,W14 ..... 122.50
S.Duquesne,Pa. U5 ..... 122.50
Warren,O. C17 ..... 122.50

SKELP

Aliquippa,Pa. J5 ..... 5.05
Benwood,W.Va. W10 ..... 5.05
Ind.Harbor,Ind. Y1 ..... 5.05
Munhall,Pa. P5 ..... 5.05
Pittsburgh J5 ..... 5.05
Warren,O. R2 ..... 5.05
Youngstown R2, U5 ..... 5.05

WIRE RODS

AlabamaCity,Ala. R2 ..... 6.40
Aliquippa,Pa. J5 ..... 6.40
Alton,Ill. L1 ..... 6.60
Bartonville,Ill. K4 ..... 6.50
Buffalo W12 ..... 6.40
Cleveland A7 ..... 6.40
Donora,Pa. A7 ..... 6.40
Fairfield,Ala. T2 ..... 6.40
Houston S5 ..... 6.65
IndianaHarbor,Ind. Y1 ..... 6.40
Johnstown,Pa. B2 ..... 6.40
Joliet,Ill. A7 ..... 6.40
KansasCity,Mo. S5 ..... 6.65
Kokomo,Ind. C16 ..... 6.50
LosAngeles B3 ..... 7.20
Minnequa,Colo. C10 ..... 6.65
Monessen,Pa. P7 ..... 6.40
N.Tonawanda S47 ..... 6.40
Pittsburg,Calif. C11 ..... 7.20
Portsmouth,O. P12 ..... 6.40
Roebling,N.J. R5 ..... 6.50
S.Chicago,Ill. R2, W14 ..... 6.40
SparrowsPoint,Md. B2 ..... 6.50
Sterling,Ill.(1) N15 ..... 6.40
Sterling,Ill. N15 ..... 6.50
Struthers,O. Y1 ..... 6.40
Worcester,Mass. A7 ..... 6.70

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity,Ala. R2 ..... 5.50
Aliquippa,Pa. J5 ..... 5.50
Atlanta A11 ..... 5.70
Bessemer,Ala. T2 ..... 5.50
Bethlehem,Pa. B2 ..... 5.55
Birmingham C15 ..... 5.50
Clairton,Pa. U5 ..... 5.50
Fairfield,Ala. T2 ..... 5.50
Fontana,Calif. K1 ..... 6.30
Gary,Ind. U5 ..... 5.50
Geneva,Utah C11 ..... 5.50
Houston S5 ..... 5.60
Ind.Harbor,Ind. I-2, Y1 ..... 5.50
Johnstown,Pa. B2 ..... 5.55
Joliet,Ill. P22 ..... 5.50
KansasCity,Mo. S5 ..... 5.60
Lackawanna,N.Y. B2 ..... 5.55
LosAngeles B3 ..... 6.20
Minnequa,Colo. C10 ..... 5.80
Munhall,Pa. U5 ..... 5.50
Niles,Calif. P1 ..... 6.25
Phoenixville,Pa. P4 ..... 5.55
Portland,Oreg. O4 ..... 6.25
Seattle B3 ..... 6.25
S.Chicago,Ill. U5, W14 ..... 5.50
S.SanFrancisco B3 ..... 6.15
Sterling,Ill. N15 ..... 5.50
Struthers,O. Y1 ..... 5.50
Torrance,Calif. C11 ..... 6.20
Weirton,W.Va. W6 ..... 5.50

Wide Flange

Bethlehem,Pa. B2 ..... 5.55
Clairton,Pa. U5 ..... 5.50
Fontana,Calif. K1 ..... 6.45
IndianaHarbor,Ind. I-2 ..... 5.50
Lackawanna,N.Y. B2 ..... 5.55
Munhall,Pa. U5 ..... 5.50
Phoenixville,Pa. P4 ..... 5.55
S.Chicago,Ill. U5 ..... 5.50
Sterling,Ill. N5 ..... 5.50
Weirton,W.Va. W6 ..... 5.50

Alloy Std. Shapes

Aliquippa,Pa. J5 ..... 6.80
Clairton,Pa. U5 ..... 6.80
Gary,Ind. U5 ..... 6.80
Houston S5 ..... 6.90
Munhall,Pa. U5 ..... 6.80
S.Chicago,Ill. U5, W14 ..... 6.80

H.S., L.A., Std. Shapes

Aliquippa,Pa. J5 ..... 8.05
Bessemer,Ala. T2 ..... 8.05
Bethlehem,Pa. B2 ..... 8.10
Clairton,Pa. U5 ..... 8.05
Fairfield,Ala. T2 ..... 8.05
Fontana,Calif. K1 ..... 8.85
Gary,Ind. U5 ..... 8.05
Geneva,Utah C11 ..... 8.05
Houston S5 ..... 8.15
Ind.Harbor,Ind. I-2, Y1 ..... 8.05
Johnstown,Pa. B2 ..... 8.10
KansasCity,Mo. S5 ..... 8.15
Lackawanna,N.Y. B2 ..... 8.10
LosAngeles B3 ..... 8.75
Munhall,Pa. U5 ..... 8.05
Phoenixville,Pa. P4 ..... 8.10
Seattle B3 ..... 8.80
S.Chicago,Ill. U5, W14 ..... 8.05
S.SanFrancisco B3 ..... 8.70
Sterling,Ill. N15 ..... 7.75
Struthers,O. Y1 ..... 8.05

H.S., L.A., Wide Flange

Bethlehem,Pa. B2 ..... 8.10
Ind.Harbor,Ind. I-2 ..... 8.05
Lackawanna,N.Y. B2 ..... 8.10
Munhall,Pa. U5 ..... 8.05
S.Chicago,Ill. U5 ..... 8.05
Sterling,Ill. N15 ..... 7.75

PILING

BEARING PILES

Bethlehem,Pa. B2 ..... 5.55
Ind.Harbor,Ind. I-2 ..... 5.50
Lackawanna,N.Y. B2 ..... 5.55
Munhall,Pa. U5 ..... 5.50
S.Chicago,Ill. I-2, U5 ..... 5.50

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ..... 6.50
Lackawanna,N.Y. B2 ..... 6.50
Munhall,Pa. U5 ..... 6.50
S.Chicago,Ill. I-2, U5 ..... 6.50
Weirton,W.Va. W6 ..... 6.50

PLATES

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ..... 5.30
Aliquippa,Pa. J5 ..... 5.30
Ashland,Ky.(15) A10 ..... 5.30
Bessemer,Ala. T2 ..... 5.30
Clairton,Pa. U5 ..... 5.30
Claymont,Del. P4 ..... 5.30
Cleveland J5, R2 ..... 5.30
Coatesville,Pa. L7 ..... 5.30
Conshohocken,Pa. A3 ..... 5.30
Ecorse,Mich. G5 ..... 5.30
Fairfield,Ala. T2 ..... 5.30
Farrell,Pa. S3 ..... 5.30
Fontana,Calif.(30) K1 ..... 6.10
Gary,Ind. U5 ..... 5.30
Geneva,Utah C11 ..... 5.30
GraniteCity,Ill. G4 ..... 5.40
Houston S5 ..... 5.40
Ind.Harbor,Ind. I-2, Y1 ..... 5.30
Johnstown,Pa. B2 ..... 5.30
Lackawanna,N.Y. B2 ..... 5.30
Mansfield,O. E6 ..... 5.30
Minnequa,Colo. C10 ..... 6.15
Munhall,Pa. U5 ..... 5.30
Newport,Ky. A2 ..... 5.30
Pittsburgh J5 ..... 5.30
Riverdale,Ill. A1 ..... 5.30
Seattle B2 ..... 6.20
Sharon,Pa. S3 ..... 5.30
S.Chicago,Ill. U5, W14 ..... 5.30
SparrowsPoint,Md. B2 ..... 5.30
Sterling,Ill. N15 ..... 5.30
Steubenville,O. W10 ..... 5.30
Warren,O. R2 ..... 5.30
Youngstown U5, Y1 ..... 5.30
Youngstown(27) R2 ..... 5.30

PLATES, Corbon Abros. Resist.

Claymont,Del. P4 ..... 7.05
Fontana,Calif. K1 ..... 7.85
Geneva,Utah C11 ..... 7.05
Houston S5 ..... 7.15
Johnstown,Pa. B2 ..... 7.05
SparrowsPoint,Md. B2 ..... 7.05

PLATES, Wrought Iron

Economy,Pa. B14 ..... 14.10

PLATES, H.S., L.A.

Aliquippa,Pa. J5 ..... 7.95
Ashland,Ky. A10 ..... 7.95
Bessemer,Ala. T2 ..... 7.95
Clairton,Pa. U5 ..... 7.95
Claymont,Del. P4 ..... 7.95
Cleveland J5, R2 ..... 7.95
Coatesville,Pa. L7 ..... 7.95
Conshohocken,Pa. A3 ..... 7.95
Economy,Pa. B14 ..... 7.95
Ecorse,Mich. G5 ..... 7.95
Fairfield,Ala. T2 ..... 7.95
Farrell,Pa. S3 ..... 7.95
Fontana,Calif.(30) K1 ..... 8.75
Gary,Ind. U5 ..... 7.95
Geneva,Utah C11 ..... 7.95
Houston S5 ..... 8.05
Ind.Harbor,Ind. I-2, Y1 ..... 7.95
Johnstown,Pa. B2 ..... 7.95
Munhall,Pa. U5 ..... 7.95
Pittsburgh J5 ..... 7.95
Seattle B3 ..... 8.85
Sharon,Pa. S3 ..... 7.95
S.Chicago,Ill. U5, W14 ..... 7.95
SparrowsPoint,Md. B2 ..... 7.95
Sterling,Ill. N15 ..... 7.625
Warren,O. R2 ..... 7.95
Youngstown U5, Y1 ..... 7.95

PLATES, Alloy

Claymont,Del. P4 ..... 7.50
Coatesville,Pa. L7 ..... 7.50
Economy,Pa. B14 ..... 7.50
Farrell,Pa. S3 ..... 7.50
Fontana,Calif. K1 ..... 8.30
Gary,Ind. U5 ..... 7.50
Houston S5 ..... 7.60
Ind.Harbor,Ind. Y1 ..... 7.50
Johnstown,Pa. B2 ..... 7.50
Lowellville,O. S3 ..... 7.50
Munhall,Pa. U5 ..... 7.50
Newport,Ky. A2 ..... 7.50
Pittsburgh J5 ..... 7.50
Seattle B3 ..... 8.40
Sharon,Pa. S3 ..... 7.50
S.Chicago,Ill. U5, W14 ..... 7.50
SparrowsPoint,Md. B2 ..... 7.50
Youngstown Y1 ..... 7.50

PLATES, Ingot Iron

Ashland c.l. (15) A10 ..... 5.55
Ashland l.c.l.(15) A10 ..... 6.05
Cleveland c.l. R22 ..... 6.05
Warren,O. R2 ..... 6.05

FLOOR PLATES

Cleveland J5 ..... 6.375
Claymont,Del. P4 ..... 6.375
Conshohocken,Pa. A3 ..... 6.375
Ind.Harbor,Ind. I-2 ..... 6.375
Munhall,Pa. U5 ..... 6.375
Pittsburgh J5 ..... 6.375
S.Chicago,Ill. U5 ..... 6.375

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ..... 5.675
Aliquippa,Pa.(9) J5 ..... 5.675
Alton,Ill. L1 ..... 5.875
Atlanta(9) A11 ..... 5.875
Bessemer,Ala.(9) T2 ..... 5.675
Birmingham(9) C15 ..... 5.675
Buffalo(9) R2 ..... 5.675
Canton,O.(23) R2 ..... 6.15
Clairton,Pa.(9) U5 ..... 5.675
Cleveland(9) R2 ..... 5.675
Ecorse,Mich.(9) G5 ..... 5.675
Emeryville,Calif. J7 ..... 6.425
Fairfield,Ala.(9) T2 ..... 5.675
Fairless,Pa.(9) U5 ..... 5.825
Fontana,Calif.(9) K1 ..... 6.375
Gary,Ind.(9) U5 ..... 5.675
Houston(9) S5 ..... 5.925
Ind.Harbor(9) I-2, Y1 ..... 5.675
Johnstown,Pa.(9) B2 ..... 5.675
Joliet,Ill. P2 ..... 5.675
KansasCity,Mo.(9) S5 ..... 5.925
Lackawanna(9) B2 ..... 5.675
LosAngeles(9) B3 ..... 6.375
Massillon,O.(23) R2 ..... 6.15
Midland,Pa.(23) C18 ..... 6.025
Milton,Pa. M18 ..... 5.825
Minnequa,Colo. C10 ..... 6.125
Niles,Calif. P1 ..... 6.375
N.Tonawanda S47 ..... 5.675
Owensboro,Ky.(9) G8 ..... 6.025
Pittsburg,Calif.(9) C11 ..... 6.375
Pittsburgh(9) J5 ..... 5.675
Portland,Oreg. O4 ..... 6.425
Riverdale,Ill.(9) A1 ..... 5.675
Seattle(9) A24,B3,N15 ..... 6.425
S.Ch'c'go(9)R2,U5,W14 ..... 5.675
S.Duquesne,Pa.(9) U5 ..... 5.675
S.SanFran.,Calif.(9) B3 ..... 6.425
Sterling,Ill.(1)(9) N15 ..... 5.675
Sterling,Ill.(9) N15 ..... 5.775
Struthers,O.(9) Y1 ..... 5.675
Tonawanda,N.Y. B12 ..... 5.675
Torrance,Calif.(9) C11 ..... 6.375
Warren,O. C17 ..... 6.025
Youngstown(9) R2, U5 ..... 5.675

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 ..... 6.725
Bethlehem,Pa. B2 ..... 6.725
Bridgeport,Conn. C32 ..... 6.80
Buffalo R2 ..... 6.725
Canton,O. R2, T7 ..... 6.725
Clairton,Pa. U5 ..... 6.725
Detroit S41 ..... 6.725
Economy,Pa. B14 ..... 6.725
Ecorse,Mich. G5 ..... 6.725
Farrell,Pa. S3 ..... 6.725
Fontana,Calif. K1 ..... 7.775
Gary,Ind. U5 ..... 6.725
Houston S5 ..... 6.975
Ind.Harbor,Ind. I-2, Y1 ..... 6.725
Johnstown,Pa. B2 ..... 6.725
KansasCity,Mo. S5 ..... 6.975
Lackawanna,N.Y. B2 ..... 6.725
LosAngeles B3 ..... 7.775
Lowellville,O. S3 ..... 6.725
Massillon,O. R2 ..... 6.725
Midland,Pa. C18 ..... 6.725
N.Tonawanda S47 ..... 6.725
Owensboro,Ky. G8 ..... 6.725
Pittsburgh J5 ..... 6.725
Seattle(6) B3 ..... 7.825
Sharon,Pa. S3 ..... 6.725
S.Chicago R2, U5, W14 ..... 6.725
S.Duquesne,Pa. U5 ..... 6.725
Struthers,O. Y1 ..... 6.725
Warren,O. C17 ..... 6.725
Youngstown U5 ..... 6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy

Aliquippa,Pa. J5 ..... 8.30
Bessemer,Ala. T2 ..... 8.30
Bethlehem,Pa. B2 ..... 8.30
Clairton,Pa. U5 ..... 8.30
Cleveland R2 ..... 8.30
Ecorse,Mich. G5 ..... 8.30
Fairfield,Ala. T2 ..... 8.30
Fontana,Calif. K1 ..... 9.00
Gary,Ind. U5 ..... 8.30
Houston S5 ..... 8.55
Ind.Harbor,Ind. Y1 ..... 8.30
Johnstown,Pa. B2 ..... 8.30
KansasCity,Mo. S5 ..... 8.55
Lackawanna,N.Y. B2 ..... 8.30
LosAngeles B3 ..... 9.00
Pittsburgh J5 ..... 8.30
Seattle B3 ..... 9.05
S.Chicago,Ill. R2, W14 ..... 8.30
S.Duquesne,Pa. U5 ..... 8.30
S.SanFrancisco B3 ..... 9.05
Sterling,Ill. N15 ..... 7.925
Struthers,O. Y1 ..... 8.30
Youngstown U5 ..... 8.30

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ..... 5.825
Houston(9) S5 ..... 5.925
KansasCity,Mo.(9) S5 ..... 5.925
Lackawanna(9) B2 ..... 5.675
Sterling,Ill. N15 ..... 5.775
Sterling,Ill.(1) N15 ..... 5.675
Tonawanda,N.Y. B12 ..... 5.675

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 ..... 5.675
Atlanta A11 ..... 5.875
Joliet,Ill. P22 ..... 5.675
Minnequa,Colo. C10 ..... 6.125
Niles,Calif. P1 ..... 6.375
Pittsburgh J5 ..... 5.675
Portland,Oreg. O4 ..... 6.425
SanFrancisco S7 ..... 6.52
Seattle B3 ..... 6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron

Economy,Pa. B14 ..... 16.45

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 ..... 6.80
Clairton,Pa. U5 ..... 6.80
Gary,Ind. U5 ..... 6.80
Houston S5 ..... 7.05
KansasCity,Mo. S5 ..... 7.06
Pittsburgh J5 ..... 6.80
Youngstown U5 ..... 6.80

BARS, C.F. Leaded (Including leaded extra)

Carbon

LosAngeles P2, S30 ..... 11.75*

Alloy

Ambridge,Pa. W18 ..... 10.175
BeaverFalls,Pa. M12 ..... 10.175
Camden,N.J. P13 ..... 10.35
Chicago W18 ..... 10.175
Elyria,O. W8 ..... 10.175
Monaca,Pa. S17 ..... 10.175
Newark,N.J. W18 ..... 10.35
SpringCity,Pa. K3 ..... 10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ..... 7.65
BeaverFalls,Pa. M12,R2 ..... 7.65
Birmingham C15 ..... 8.10
Buffalo B5 ..... 7.70
Camden,N.J. P13 ..... 8.10
Carnegie,Pa. C12 ..... 7.65
Chicago W18 ..... 7.65
Cleveland A7, C20 ..... 7.65
Detroit B5, H5, P17 ..... 7.85
Detroit S41 ..... 7.65
Donora,Pa. A7 ..... 7.65
Elyria,O. W8 ..... 7.65
FranklinPark,Ill. N5 ..... 7.65
Gary,Ind. R2 ..... 7.65
GreenBay,Wis. F7 ..... 7.65
Hammond,Ind. J5, L2 ..... 7.65
Hartford,Conn. R2 ..... 8.15
Harvey,Ill. B5 ..... 7.65
LosAngeles(49) S30 ..... 9.10
LosAngeles(49) P2, R2 ..... 9.10
Mansfield,Mass. B5 ..... 8.20
Massillon,O. R2, R8 ..... 7.65
Midland,Pa. C18 ..... 7.65
Monaca,Pa. S17 ..... 7.16
Newark,N.J. W18 ..... 8.10
NewCastle,Pa.(17) B4 ..... 7.65
Pittsburgh J5 ..... 7.65
Plymouth,Mich. P5 ..... 7.90
Putnam,Conn. W18 ..... 8.20
Readville,Mass. C14 ..... 8.20
Seattle(49) S30 ..... 9.10
S.Chicago,Ill. W14 ..... 7.65
SpringCity,Pa. K3 ..... 8.10
Struthers,O. Y1 ..... 7.65
Warren,O. C17 ..... 7.65
Waukegan,Ill. A7 ..... 7.65
Willimantic,Conn. J5 ..... 8.15
Youngstown F3, Y1 ..... 7.65

BARS, Cold-Finished Alloy (Turned and Ground)

Cumberland,Md.(5) C19 ..... 6.55

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ..... 9.025
BeaverFalls,Pa. M12,R2 ..... 9.025
Bethlehem,Pa. B2 ..... 9.025
Bridgeport,Conn. C32 ..... 9.175
Buffalo B5 ..... 9.025
Camden,N.J. P13 ..... 9.20
Canton,O. T7 ..... 9.025
Carnegie,Pa. C12 ..... 9.025
Chicago W18 ..... 9.025
Cleveland A7, C20 ..... 9.25
Detroit B5, P17 ..... 9.225
Detroit H5, S41 ..... 9.025
Donora,Pa. A7 ..... 9.025
Elyria,O. W8 ..... 9.025
FranklinPark, Ill. N5 ..... 9.025
Gary,Ind. R2 ..... 9.025
GreenBay,Wis. F7 ..... 9.025

Hammond, Ind. J5, L2 ..9.025
Hartford, Conn. R2 ....9.325
Harvey, Ill. R5 .....9.025
Lackawanna, N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield, Mass. B5 ...9.325
Massillon, O. R2, R8 ...9.025
Midland, Pa. C18 .....9.025
Monaca, Pa. S17 .....9.025
Newark, N.J. W18 .....9.20
N. Tonawanda S47 ....9.025
Plymouth, Mich. P5 ...9.225
S. Chicago, Ill. W14 ....9.025
SpringCity, Pa. K3 ....9.20
Struthers, O. Y1 .....9.025
Warren, O. C17 .....9.025
Waukegan, Ill. A7 ....9.025
Willimantic, Conn. J5 ..9.325
Worcester, Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

Atlanta A11 .....5.00
Birmingham C15 .....5.25
Ecorse, Mich. G5 .....5.675
Emeryville, Calif. J7 ..6.425
Fontana, Calif. K1 ....6.375
Ind. Harbor, Ind. Y1 ....5.675
Johnstown, Pa. B2 ....5.675
Joliet, Ill. P22 .....5.675
Kokomo, Ind. C16 .....5.775
Lackawanna, N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison, Ill. L1 .....5.475
Milton, Pa. M18 .....5.825
Minnequa, Colo. C10 ..6.125
Niles, Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland, Oreg. O4 ....6.425
Seattle A24, B3, N14 ..6.425
S. Chicago, Ill. W14 ....5.675
S. SanFrancisco B3 ...6.425
SparrowsPoint, Md. B2 .5.675
Steelton, Pa. B2 .....5.675
Sterling, Ill. (1) N15 ..5.675
Sterling, Ill. N15 .....5.775
Struthers, O. Y1 .....5.675
Tonawanda, N.Y. B12 ..6.10

BARS, Reinforcing, Billet (Fabricated, to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown, Pa. B2 .....7.33
Lackawanna, N.Y. B2 ..7.35
Marion, O. P11 .....6.70
Newark, N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint, Md. B2 ..7.33
St. Paul U8 .....8.17

BARS, Wrought Iron

Economy, Pa. (8.R.) B14 16.10
Economy, Pa. (D.R.) B14 20.50
Econ. (DirectRolled) B14 13.55
Economy (Staybolt) B14 20.50
McK. Rks. (8.R.) L5 ...16.10
McK. Rks. (D.R.) L5 ...20.50
McK. Rks. (DirRolled) L5 13.55

BARS, Rail Steel

ChicagoHts. (3) C2, I-2 5.575
ChicagoHts. (4) (44) I-2 5.675
ChicagoHts. (4) C2 ....5.675
Franklin, Pa. (3) F5 ...5.575
Franklin, Pa. (4) F5 ...5.675
JerseyShore, Pa. (3) J8 ..5.55
Marion, O. (3) P11 ....5.575
Tonawanda (3) B12 ....5.575
Tonawanda (4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity, Ala. R2 ..5.10
Allenport, Pa. P7 .....5.10
Aliquippa, Pa. J5 .....5.10
Ashland, Ky. (8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken, Pa. A3 ..5.15
Detroit (8) M1 .....5.10
Ecorse, Mich. G5 .....5.10
Fairfield, Ala. T2 .....5.10
Fairless, Pa. U5 .....5.15
Farrell, Pa. S3 .....5.10
Fontana, Calif. K1 ....5.825
Gary, Ind. U5 .....5.10
Geneva, Utah C11 .....5.20
GraniteCity, Ill. (8) G4 ..5.20
Ind. Harbor, Ind. I-2, Y1 5.10
Irvin, Pa. U5 .....5.10
Lackawanna, N.Y. B2 ..5.10
Mansfield, O. E6 .....5.10
Munhall, Pa. U5 .....5.10
Newport, Ky. A2 .....5.10
Niles, O. M21, S3 .....5.10
Pittsburg, Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth, O. P12 ....5.10
Riverdale, Ill. A1 .....5.10
Sharon, Pa. S3 .....5.10
S. Chicago, Ill. U5, W14 ..5.10
SparrowsPoint, Md. B2 .5.10
Steubenville, O. W10 ....5.10
Warren, O. R2 .....5.10
Weirton, W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles, O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary, Ind. U5 .....8.40
Ind. Harbor, Ind. Y1 ....8.40
Irvin, Pa. U5 .....8.40
Munhall, Pa. U5 .....8.40
Newport, Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa, Pa. J5 .....7.525
Ashland, Ky. A10 .....7.525
Cleveland J5, R2 ....7.525
Conshohocken, Pa. A3 ..7.575
Ecorse, Mich. G5 .....7.525
Fairfield, Ala. T2 .....7.525
Fairless, Pa. U5 .....7.575
Farrell, Pa. S3 .....7.525
Fontana, Calif. K1 .....8.25
Gary, Ind. U5 .....7.525
Ind. Harbor, Ind. I-2, Y1 7.525
Irvin, Pa. U5 .....7.525
Lackawanna (35) B2 ..7.525
Munhall, Pa. U5 .....7.525
Niles, O. S3 .....7.525
Pittsburgh J5 .....7.525
S. Chicago, Ill. U5, W14 7.525
Sharon, Pa. S3 .....7.525
SparrowsPoint (36) B2 .7.525
Warren, O. R2 .....7.525
Weirton, W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland, Ky. (8) A10 ....5.35
Cleveland R2 .....5.875
Warren, O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown, O. A10 ....6.775
Warren, O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity, Ala. R2 ..6.275
Aliquippa, Pa. J5 .....6.275
Allenport, Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken, Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse, Mich. G5 .....6.275
Fairfield, Ala. T2 .....6.275
Fairless, Pa. U5 .....6.325
Follansbee, W.Va. F4 ..6.275
Fontana, Calif. K1 ....7.40
Gary, Ind. U5 .....6.275
GraniteCity, Ill. G4 ....6.375
Ind. Harbor, Ind. I-2, Y1 6.275
Irvin, Pa. U5 .....6.275
Lackawanna, N.Y. B2 ..6.275
Mansfield, O. E6 .....6.275
Middletown, O. A10 ....6.275
Newport, Ky. A2 .....6.275
Pittsburg, Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth, O. P12 ....6.275
SparrowsPoint, Md. B2 .6.275
Steubenville, O. W10 ....6.275
Warren, O. R2 .....6.275
Weirton, W.Va. W6 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa, Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse, Mich. G5 .....9.275
Fairless, Pa. U5 .....9.325
Fontana, Calif. K1 ....10.40
Gary, Ind. U5 .....9.275
Ind. Harbor, Ind. I-2, Y1 9.275
Lackawanna (38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint (33) B2 ..9.275
Warren, O. R2 .....9.275
Weirton, W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala. City, Ala. R2	7.125	....
Ashland, Ky. A10	7.225	7.475
Canton, O. R2	7.125	....
Fairfield, Ala. T2	7.125	7.375
Gary, Ind. U5	7.125	7.375
GraniteCity, Ill. G4	7.225	....
Ind. Harbor I-2	7.225	7.425
Irvin, Pa. U5	7.125	7.375
Kokomo, Ind. C16	7.325	....
MartinsFry. W10	7.125	7.375
Pitts., Calif. C11	7.875	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....
Weirton W6	7.125	....

SHEETS, Culvert—Pure Iron

Ind. Harbor, Ind. I-2 ....7.475

SHEETS, Enameling

Ashland, Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield, Ala. T2 .....6.775
Gary, Ind. U5 .....6.775
Ind. Harbor, Ind. I-2, Y1 6.775
Irvin, Pa. U5 .....6.775
Middletown, O. A10 ....6.775
Niles, O. M21, S3 .....6.775
SparrowsPoint, Md. B2 ..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover, O. E6 .....8.70
Ind. Harbor, Ind. I-2 ....8.70
Mansfield, O. E6 .....8.70
Warren, O. R2 .....8.70
Yorkville, O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee, W.Va. W10 7.225
Gary, Ind. U5 .....7.225
Mansfield, O. E6 .....7.225
Middletown, O. A10 ....7.225
Niles, O. M21, S3 .....7.225
Warren, O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown, O. A10 ....7.625

SHEETS, Aluminum Coated

Butler, Pa. A10 (type 1) 9.525
Butler, Pa. A10 (type 2) 9.625
Irvin, Pa. U5 (type 1) 9.525

SHEETS, Wall Casing

Fontana, Calif. K1 ....7.325
Geneva, Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low Alloy

Irvin, Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt. (39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton, O. R2 .....7.175
Irvin, Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland, Ky. A10 ....7.125
Middletown, O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield, O. C3 .....7.50
Cleveland (28) R2 ....7.65
Niles, O. (28) R2 .....7.65
Weirton, W.Va. W6 .....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity, Ala. R2 .6.875‡
Ashland, Ky. A10 ....6.875‡
Canton, O. R2 .....6.875‡
Dover, O. E6 .....6.875†
Fairfield, Ala. T2 ....6.875†
Gary, Ind. U5 .....6.875†
GraniteCity, Ill. G4 ..6.975*
Ind. H'rb'r, Ind. I-2, Y1 6.875†
Irvin, Pa. U5 .....6.875†
Kokomo, Ind. C16 ....6.975‡
MartinsFerry, O. W10. .6.875*
Middletown, O. A10 ..6.875†
Pittsburg, Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt., Md. B2 ..6.875†
Warren, O. R2 .....6.875†
Weirton, W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire Div., Hoover Ball & Bearing
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N. Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
J10 Jay Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M-1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N17 National Steel Corp.
N20 Neville Ferro Alloy Co.

O1 Ohio Ferro-Alloys Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P25 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S31 Sawhill Tubular Products
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada
S47 Seaway Steel Corp.

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Div., National Steel Corp.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala. City, Ala. (27) R2	5.10
Allenport, Pa. P7	5.10
Alton, Ill. L1	5.30
Ashland, Ky. (8) A10	5.10
Atlanta A11	5.10
Bessemer, Ala. T2	5.10
Birmingham C15	5.10
Conshohocken, Pa. A3	5.15
Detroit M1	5.10
Ecorse, Mich. G5	5.10
Fairfield, Ala. T2	5.10
Farrell, Pa. S3	5.10
Fontana, Calif. K1	5.825
Gary, Ind. U5	5.10
Ind. Harbor, Ind. I-2, Y1	5.10
Johnstown, Pa. (25) B2	5.10
Lackaw'na, N.Y. (25) B2	5.10
LosAngeles (25) B3	5.85
LosAngeles C1	8.60
Minnequa, Colo. C10	6.20
Riverdale, Ill. A1	5.10
SanFrancisco S7	6.60
Seattle (25) B3	6.10
Seattle N14	6.60
Sharon, Pa. S3	5.10
S. Chicago, Ill. W14	5.10
S. SanFrancisco (25) B3	5.85
SparrowsPoint, Md. B2	5.10
Torrance, Calif. C11	5.85
Warren, O. R2	5.10
Weirton, W. Va. W6	5.10
Youngstown U5, Y1	5.10

STRIP, Hot-Rolled Alloy

Carnegie, Pa. S18	8.40
Farrell, Pa. S3	8.40
Gary, Ind. U5	8.40
Houston S5	8.65
Ind. Harbor, Ind. Y1	8.40
KansasCity, Mo. S5	8.65
LosAngeles B3	9.60
Lowellville, O. S3	8.40
Newport, Ky. A2	8.40
Sharon, Pa. A2, S3	8.40
S. Chicago, Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland, Ky. A10	7.575
Bessemer, Ala. T2	7.575
Conshohocken, Pa. A3	7.575
Ecorse, Mich. G5	7.575
Fairfield, Ala. T2	7.575
Farrell, Pa. S3	7.575
Gary, Ind. U5	7.575
Ind. Harbor, Ind. I-2, Y1	7.575
Lackawanna, N.Y. B2	7.575
LosAngeles (25) B3	8.325
Seattle (25) B3	8.575
Sharon, Pa. S3	7.575
S. Chicago, Ill. W14	7.575
S. SanFrancisco (25) B3	8.325
SparrowsPoint, Md. B2	7.575
Warren, O. R2	7.575
Weirton, W. Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10	5.35
Warren, O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson, Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7	7.425
Dearborn, Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover, O. G6	7.425
Evanston, Ill. M22	7.425
Farrell, Pa. S3	7.425
Follansbee, W. Va. W10	7.425
Fontana, Calif. K1	9.20
FranklinPark, Ill. T6	7.425
Ind. Harbor, Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport, Pa. E10	7.525
NewBedford, Mass. R10	7.875
NewBritain, Conn. S15	7.875
NewCastle, Pa. B4, M23	7.425
NewHaven, Conn. D2	7.875
NewKensington, Pa. A6	7.425
Pawtucket, R.I. R3, N8	7.975
Philadelphia P24	7.875
Riverdale, Ill. A1	7.425
Rome, N.Y. (32) R6	7.425
Sharon, Pa. S3	7.425
Trenton, N.J. (31) R5	8.875
Warren, O. R2, T5	7.425
Worcester, Mass. A7	7.975
Youngstown Y1	7.425
Youngstown S41	7.425

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie, Pa. S18	15.55
Cleveland A7	15.55
Dover, O. G6	15.55
Farrell, Pa. S3	15.55
FranklinPark, Ill. T6	15.55
Harrison, N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville, O. S3	15.55
Pawtucket, R.I. S8	15.90
Riverdale, Ill. A1	15.55
Sharon, Pa. S3	15.55
Worcester, Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High Strength, Low-Alloy

Cleveland A7	10.80
Dearborn, Mich. S3	10.80
Dover, O. G6	10.80
Farrell, Pa. S3	10.80
Ind. Harbor, Ind. Y1	10.80
Sharon, Pa. S3	10.80
Warren, O. R2	10.80
Weirton, W. Va. W6	10.80
Youngstown Y1	10.80

STRIP, Galvanized (Continuous)

Farrell, Pa. S3	7.50
Sharon, Pa. S3	7.50

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson, Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie, Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn, Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover, O. G6	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. M22	9.05	10.40	12.60	15.60	....
Farrell, Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria, O. S1	10.05	10.40	12.60	15.60	....
FranklinPark, Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison, N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain, Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle, Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven, Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington, Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket, R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome, N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon, Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton, N.J. R5	....	10.70	12.90	15.90	18.85
Warren, O. T5	8.95	10.40	12.60	15.60	18.55
Worcester, Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)

	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol, Conn. W1	....	18.85	22.95	27.80
Buffalo W12	....	18.85	....	....
Fostoria, O. S1	....	19.05	22.15	....
FranklinPark, Ill. T6	....	19.20	23.30	28.15
Harrison, N.J. C18	....	18.85	22.95	27.80
NewYork W3	....	18.85	22.95	27.80
Palmer, Mass. W12	....	18.85	....	....
Trenton, N.J. R5	....	18.85	22.95	27.80
Worcester, Mass. A7, T6	....	18.85	22.95	27.80
Youngstown S41	....	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7	7.425*
Dover, O. G6	7.425*
Evanston, Ill. M22	7.525*
McKeesport, Pa. E10	7.50*
NewCastle, Pa. M23	7.425*
Riverdale, Ill. A1	7.525*
Warren, O. B9, S3, T5	7.425*
Worcester, Mass. A7	7.975
Youngstown S41	7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren, O. R2	8.175

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell, Pa. S3	5.525
Riverdale, Ill. A1	5.675
Sharon, Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Basis Weight 45 lb	50 lb	55 lb	60 lb
Fairfield, Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless, Pa. U5	6.10	6.25	6.40	6.55
Gary, Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor, Ind. I-2	6.10	6.25	6.40	6.55
Irvin, Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint, Md. B2	6.10	6.25	6.40	6.55
Weirton, W. Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Electrolytic (100 lb basis wt) — 0.25 lb Coating

Aliquippa, Pa. J5	$9.10
Fairfield, Ala. T2	9.10
Fairless, Pa. U5	9.10
Fontana, Calif. K1	9.75
Gary, Ind. U5	9.10
GraniteCity, Ill. G4	9.20
Ind. Harb., Ind. I-2, Y1	9.10
Irvin, Pa. U5	9.10
Niles, O. R2	9.10
Pittsburg, Calif. C11	9.75
SparrowsPt., Md. B2	9.10
Weirton, W. Va. W6	9.10
Yorkville, O. W10	9.10

BLACK PLATE (Base Box)

Aliquippa, Pa. J5	$8.20
Fairfield, Ala. T2	8.20
Fairless, Pa. U5	8.20
Fontana, Calif. K1	8.85
Gary, Ind. U5	8.20
GraniteCity, Ill. G4	8.30
Ind. Harbor, Ind. I-2, Y1	8.20
Irvin, Pa. U5	8.20
Niles, O. R2	8.20
Pittsburg, Calif. C11	8.85
SparrowsPoint, Md. B2	8.20
Weirton, W. Va. W6	8.20
Yorkville, O. W10	8.20

ELECTRO. TIN-COATED SHEET (20-27 gage; per 100 lb)

IndianaHarb., Ind. Y1	$7.90

(21-27 gage; per 100 lb)

Aliquippa, Pa. J5	$7.90
Niles, O. R2	7.90

TIN PLATE, HOT DIPPED COMMON COKE

	1.25 lb	1.50 lb
Aliquippa, Pa. J5	$10.40	$10.65
Fairfield, Ala. T2	10.40	10.65
Fairless, Pa. U5	10.40	10.65
Fontana, Calif. K1	11.05	11.30
Gary, Ind. U5	10.40	10.65
Irvin, Pa. U5	10.40	10.65
Pitts., Calif. C11	11.05	11.30
Sp. Pt., Md. B2	10.40	10.65
Weirton, W. Va. W6	10.40	10.65
Yorkville, O. W10	10.40	10.65

HOLLOWARE ENAMELING (Black plate) (29 Gage)

Aliquippa, Pa. J5	7.85
Gary, Ind. U5	7.85
GraniteCity, Ill. G4	7.95
Ind. Harbor, Ind. Y1	7.85
Irvin, Pa. U5	7.85
Yorkville, O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom, W. Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge, Pa. A4	....	....	12.40	13.55	14.65
GraniteCity, Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor, Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield, O. E6	9.875*	11.70	12.40	13.55	14.65
Newport, Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles, O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift, Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren, O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville, O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield, O. E6	8.10
Vandergrift, Pa. U5	8.10
Warren, O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom, W. Va. W10	15.70	16.30	16.80	17.85
Vandergrift, Pa. U5	15.70	16.30	16.80	17.85
Zanesville, O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge, Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler, Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift, Pa. U5	..	17.10	18.10	19.70	20.20	20.70	15.70
Warren, O. R2	....	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. §Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity, Ala. R2	8.00
Aliquippa, Pa. J5	8.00
Alton, Ill. L1	8.20
Atlanta A1	8.00
Bartonville, Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville, Ind. M8	8.10
Donora, Pa. A7	8.00
Duluth A7	8.00
Fairfield, Ala. T2	8.00
Fostoria, O. (24) S1	8.10
Houston S5	8.25
Jacksonville, Fla. M8	8.35
Johnstown, Pa. B2	8.00
Joliet, Ill. A7	8.00
KansasCity, Mo. S5	8.25
Kokomo, Ind. C16	8.10
LosAngeles B3	8.95
Minnequa, Colo. C10	8.25
Monessen, Pa. P7, P16	8.00
N. Tonawanda S47	8.00
Palmer, Mass. W12	8.30
Pittsburg, Calif. C11	8.95
Portsmouth, O. P12	8.00
S. Chicago, Ill. R2	8.00
S. SanFrancisco C10	8.95
SparrowsPoint, Md. B2	8.10
Sterling, Ill. (1) N15	8.00
Sterling, Ill. N15	8.10
Struthers, O. Y1	8.00

WIRE, Gal'd., for ACSR

Elyria, O. W8	8.00
N. Tonawanda S47	8.00

WIRE, Cold Heading Carbon

Waukegan, Ill. A7	8.00
Worcester, Mass. A7	8.30
Bartonville, Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora, Pa. A7	12.65
Duluth A7	12.65
Johnstown, Pa. (10) B2	12.65
KansasCity, Mo. U3	12.90
LosAngeles (2) B3	13.60
Minnequa, Colo. C10	12.775
Monessen, Pa. P7, P16	12.65
Muncie, Ind. I-7	13.60
NewHaven, Conn. A7	12.95
Palmer, Mass. W12	13.70
Pittsburg, Calif. C11	13.45
Portsmouth, O. P12	12.65
Roebling, N.J. R5	12.95
SparrowsPt., Md. (10) B2	12.75
Struthers, O. Y1	13.40
Trenton, N.J. A7	12.95
Waukegan, Ill. A7	12.65
Worcester, Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa, Pa. J5	9.75
Alton, Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora, Pa. A7	9.75
Duluth A7	9.75
Johnstown, Pa. B2	9.75
KansasCity, Mo. S5, U3	10.00
Kokomo, Ind. C16	9.85
LosAngeles B3	10.70
Minnequa, Colo. C10	9.95
Monessen, Pa. P7, P16	9.75
NewHaven, Conn. A7	10.95
Palmer, Mass. W12	10.05
Pittsburg, Calif. C11	10.075
Portsmouth, O. P12	9.75
Roebling, N.J. R5	10.05
S. Chicago, Ill. R2	9.75
S. SanFrancisco C10	10.075
SparrowsPt., Md. B2	9.85
Struthers, O. Y1	9.75
Trenton, N.J. A7	10.05
Waukegan, Ill. A7	9.75
Worcester, Mass. A7	10.05

WIRE, MB Spring, High-Carbon

Aliquippa, Pa. J5	9.75
Alton, Ill. L1	9.95
Bartonville, Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora, Pa. A7	9.75
Duluth A7	9.75
Fostoria, O. S1	9.80
Johnstown, Pa. B2	9.75
KansasCity, Mo. S5, U3	10.00
LosAngeles B3	10.20
Milbury, Mass. (12) N6	10.05
Minnequa, Colo. C10	9.95
Monessen, Pa. P7, P16	9.75
Muncie, Ind. I-7	9.95
Palmer, Mass. W12	10.05
Pittsburg, Calif. C11	10.20
Portsmouth, O. P12	9.75
Roebling, N.J. R5	10.05
S. Chicago, Ill. R2	9.75
S. SanFrancisco C10	10.20
SparrowsPt., Md. B2	9.85
Struthers, O. Y1	9.75
Trenton, N.J. A7	10.05
Waukegan, Ill. A7	9.75
Wor'ster, Mass. A7, J4, T6	10.05

WIRE, Fine & Weaving (8" Coils)

Alton, Ill. L1	16.50
Bartonville, Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville, Ill. M8	16.40
Fostoria, O. S1	16.30
Houston S5	16.55
Jacksonville, Fla. M8	16.65
Johnstown, Pa. B2	16.30
KansasCity, Mo. S5	16.55
Kokomo, Ind. C16	16.30
Minnequa, Colo. C16	16.55
Monessen, Pa. P16	16.30
Muncie, Ind. I-7	16.50
Palmer, Mass. W12	16.60
S. SanFrancisco C10	17.15
Waukegan, Ill. A7	16.30
Worcester, Mass. A7, J6	16.60

ROPE WIRE (A)

Bartonville, Ill. K4	13.45
Buffalo W12	13.45
Fostoria, O. S41	13.45
Johnstown, Pa. B2	13.45
Monessen, Pa. P7	13.45
Muncie, Ind. I-7	13.65
Palmer, Mass. W12	13.75
Portsmouth, O. P12	13.45
Roebling, N.J. R5	13.75
St. Louis L8	13.45
SparrowsPt., Md. B2	13.55
Struthers, O. Y1	13.45
Worcester, Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	175
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler
(14½ Ga.) (per 97 lb net box)
Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	9.02
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	9.02
Kokomo,Ind. C16	8.88
LosAngeles B3	9.20
Minnequa,Colo. C10	8.02
Pittsburg,Calif. C11	9.20
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.20
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	9.30
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	9.30
Kokomo,Ind. C16	9.16
LosAngeles B3	9.50
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.50
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	9.50
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	9.35
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	9.35
Kokomo,Ind. C16	9.21
LosAngeles B3	9.55
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.55
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	9.55
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	19.10	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	17.95	19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½Ga.	J5 190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality

	6 to 8 gage An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.85	9.90
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	....
CrawfordsvilleM8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55
Houston(48) S5	9.25	9.80**
Jack'vill,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

FASTENERS

SCREWS, NUTS, BOLTS

(Consumer discounts per cent off list prices, plain finishes. For less than full container quantities, add 25 per cent; attaching nuts to bolts in sizes ¼ in. through ⅝ in. diameter through 8 in. length, price on application. Discounts are determined by the quantity of screws, nuts, and bolts ordered for one destination at one time.)

Base, one keg	43.00
20,000 lb or more	53.00

SCREWS, SETSCREWS

Hex Screws and High Strength Hex Screws, through 1 in. x 12 in.:

Base, one keg	43.00
20,000 lb or more	53.00

Hex Screws 1⅛ in. diameter and larger: See net price schedule.

Fillister Head Screws, coarse thread:

Packages	+70.00
Bulk	+28.00

Flat Head Screws, coarse thread:

Packages	+100.00
Bulk	+52.00

Setscrews, Square Head, Cup-point, coarse thread:

Packages	+10.00
Bulk	15.00

(Bulk discounts on fillister, flat head, and set screws apply only to products ordered in these minimum quantities: ¼ in. through ⅝ in. diameter, 15,000 pieces; ⅞ in. through ⅝ in. diameter, 5000 pieces; and ¾ in. through 1 in. diameter, 2000 pieces.)

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in. larger 12.85
7/16 in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St. Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S6	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1¼ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ¾" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.625c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+27.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.25	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.26	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	49.50
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	78.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	62.25
350	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	75.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	42.00
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Elwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Phoenix Steel Corp.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloy Steel Co., Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless	....	....	....	....	37.50
302	26.05	28.80	31.55	34.30	39.75
304	30.50	33.75	36.95	40.15	....
304L	38.20	42.20	46.25	50.25	58.25
316	42.30	46.75	51.20	55.65	....
316L	49.90	55.15	60.40	65.65	....
316 Cb	31.20	34.50	37.75	41.05	47.25
321	36.90	40.80	44.65	48.55	57.00
347	22.25	24.60	26.90	29.25	....
405	20.55	22.70	24.85	27.00	....
410	21.20	23.45	25.65	27.90	....
430	49.80	61.35	72.80	84.40	....
Inconel	43.20	55.05	66.95	78.90	....
Nickel	43.50	55.70	67.95	80.35	....
Nickel, Low Carbon	44.25	55.35	66.45	77.60	....
Monel					

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Claymont, Del. P4; Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
No. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago, Ill. R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
NevilleIsland, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Other U. S. Districts				
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
PortColborne, Ont. A25	65.00	65.00	65.50	66.00
SaultSte. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%. Foundry grade, 1.75% or under, deduct 50c.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
PortColborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Chicago I-3 (Phos. 0.075% max)	71.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Phos. 0.075% max)	71.00
Erie, Pa. I-3 (Phos. 0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.50	10.26	10.06	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	9.45	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.90	10.40	11.52	12.40	10.05	13.35	16.59	10.50	9.83	11.85
Buffalo	9.30	10.05	11.80	11.70	9.45	11.45	16.30	9.90	9.40	11.80
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.13	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.38	10.26	10.18	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	9.07	9.88	11.75	10.63	8.48	12.98	16.95	8.71	8.31	9.68
Detroit	9.48	10.46	10.50	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	8.67	9.48	11.35	10.23	8.08	13.10	16.55	8.31	7.91	11.57
Indianapolis	9.66	10.64	10.57	11.83	9.66	11.09	16.39	10.01	9.50	11.79
KansasCity	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.27	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.57	10.55	11.05	11.74	9.57	11.00	16.30	9.92	9.41	11.70
Newark, N. J.	9.81	10.34	11.54	12.37	10.05	13.25	16.40	10.35	9.79	11.82
New York	10.07	10.78	11.35	12.37	10.44	13.25	16.40	10.90	10.22	11.82
Philadelphia	9.50	10.00	10.66	11.25	9.65	11.95	16.38	9.85	9.60	11.10
Pittsburgh	9.22	10.53	11.68	11.49	9.22	11.25	15.95	9.57	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	10.51	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	8.82	9.49	10.64	10.99	8.82	11.49	16.54	9.17	8.66	11.70
San Francisco	10.65	11.65	11.75	12.70	10.55	15.10	17.25	11.10	10.80	12.95
Seattle	11.35	12.45	13.40	12.80	10.80	16.20	17.85	11.50	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.20	17.85	11.35	10.80	13.45

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x12½ in.; carbon plate, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hitchins, Olive Hill, Ky., Athens, Troup, Tex., Clearfield, Curwensville, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., Frostburg, Md., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Lehi, Utah, $175.

Super-Duty: Ironton, Ohio, St. Louis, Mexico, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Frostburg, Md., $200; Stevens Pottery, Ga., $210; Troup, Tex., $215; Lehi, Utah, $263.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Hawstone, Thompsontown, Pa., Ensley, Ala., Portsmouth, Ohio, St. Louis, $158; Warren, Niles, Windham, Ohio, $163; E. Chicago, Ind., Joliet, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City., Colo., $133; Philadelphia, Clearfield, Pa., $138; Warren, Ohio, $148.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Johnstown, Pa., Vandalia, Mo., $97; Chester, New Cumberland, W. Va., Freeport, Vanport, Merrill Station, Clearfield, Pa., Wellesville, Irondale, New Salisbury, Ohio, $100; Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120; Lehi, Utah, $175.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $250; Danville, Ill., $253; Fords, N. J., Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., Frostburg, Md., $260; Troup, Tex., $265.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $320; Troup, Tex., Fords, N. J., Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $360; Troup Tex., Fords, N. J., Philadelphia, $365.

Tar Bonded Brick (per ton)

Dolomite: Narlo, Ohio, $87.50. Dolomite-Magnesite: Narlo, Ohio, $109.50. Magnetite: Narlo, Ohio, $128.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310; Reesdale, Pa., $355.

Runners (per 1000)

Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234; Reesdale, Pa., $245.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines, Chewelah, Wash., $46; minus ⅝ in. grains bulk, Luning, Nev., $46; ⅝ in. grains with fines (periclase), Baltimore, $73, Pascagoula, Miss., $90.

*—9 in. x 4½ x 2.50 straights.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

——Inches—— Diam	Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:

Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $29-$29.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. truckiots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh bags	7.50††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	27.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe	36.75, ton deld. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l.	39.80; ton lots 41.80
Brass, 80/20, leaded (60 mesh)	37.80
Bronze powder, 90/10	56.80
Copper, all types	15.00*
Lead	7.50*
Manganese, 500 lb and up	25.00*
Nickel, all types	0.78-1.06
Nickel-Silver	56.00
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20

Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5% below 5 microns	2.32
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe, except as noted.)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.55	$5.60	$5.50	$5.40	$5.70
Bar Size Angles	5.85	5.90	5.80	5.70	6.00
Structural Angles	5.75	5.80	5.70	5.60	5.90
I-Beams	5.75	5.90	5.80	5.70	6.00
Channels	5.75	5.90	5.80	5.70	6.00
Plates (basic bessemer)	5.65	5.70	5.60	5.50	5.80
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	23.66	23.72	23.59	23.31	25.04
Barbed Wire (†)	6.25	6.30	6.20	6.10	6.40
Merchant Bars	6.05	6.10	6.00	5.90	6.20
Hot-Rolled Bands	6.05	6.10	6.00	5.90	6.20
Wire Rods, Thomas No. 5 (Niederrhein)	5.80*	....	5.75	5.75	6.00
Wire Rods, O.H., No. 5 (Niederrhein)	6.00*	....	5.95	5.95	6.20
Wire Rods, O.H. (Sumitomo, Japan)	5.95	....	5.90	5.90	6.05
Bright Common Wire Nails (§)	7.30	7.35	7.25	7.15	7.45

†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier. *Except Boston.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer	$11.45
Mesabi bessemer	11.60
Old Range nonbessemer	11.70
Old Range bessemer	11.85
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$15.75-16.25*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75
48% no ratio	24.00-26.00†

Turkish

48% 3:1	35.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.40

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$3.00-3.50
60-65%	3.60-4.00

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa. furnace	$14.75-15.25
Connellsville, Pa. foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.50
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.83
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.73
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

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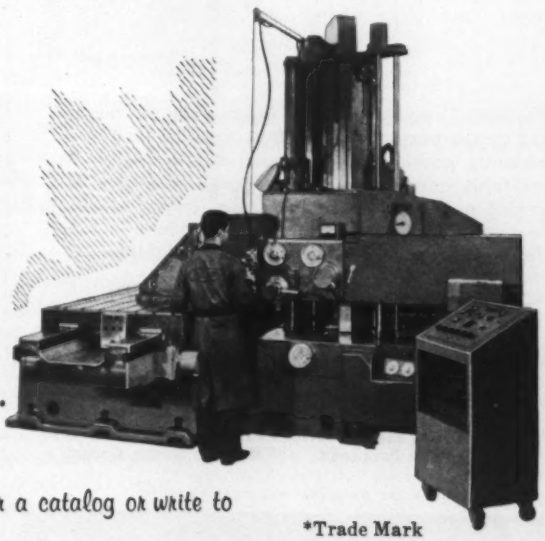
Large, easy to read clock-type dials allow the operator to "power" position the head, table, saddle and spindle in relation to the work piece without the use of hand cranks or levers. These dials, when the machine is equipped with numerical control, provide an accurate, instantaneous visual read-out on the positioning of the system.

Simple push buttons on the control pendant direct all motions of the head, table, saddle and spindle. Spindle start and stop, as well as spindle speed changes, are controlled from buttons on the pendant. Four traverse rates and feed engagement are actuated by the operator's forefinger on the pendant trigger.

Thus, within the span of a man's hand, are centralized power controls which allow the operator to keep the tool in the cut more of the time — thereby reducing costs and increasing profits.



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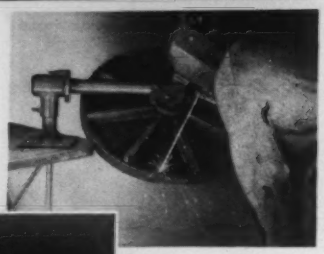
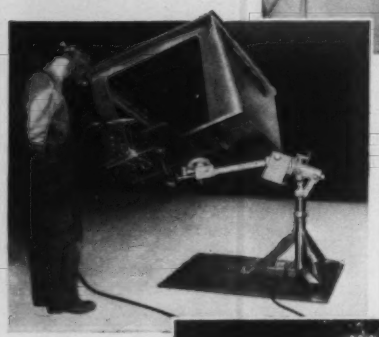
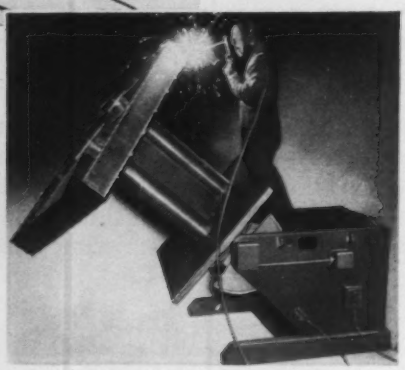
360° Table tilt allows welding on both sides of workpiece without re-clamping when you use this Aronson Bench Turntable.





Heavy bulky pieces become childs-play when balanced on an Aronson Universal Balance positioner.



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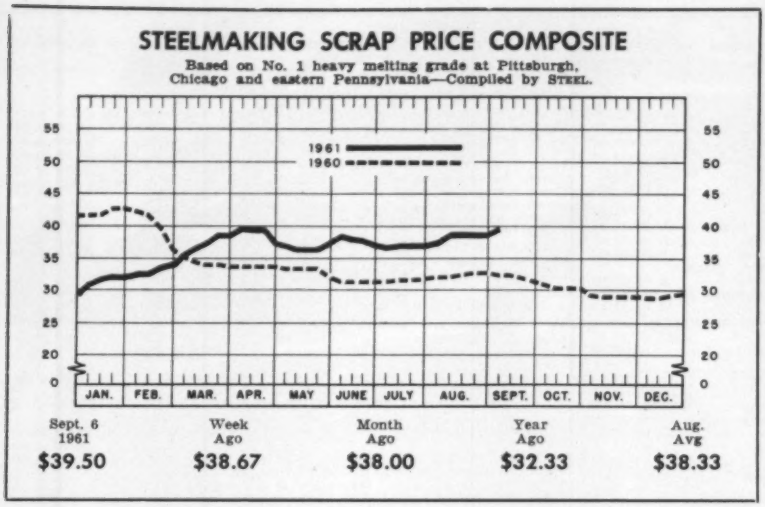

Scrap Back to Last April's Level

STEEL's composite price on No. 1 heavy melting grade rises 83 cents a ton to $39.50 as some domestic buying develops to give market an upward shove. Exports continue active

Scrap Prices, Page 154

● **Chicago** — Prices on the steel grades are holding following the recent rise of about $1 a ton. That increase was based on higher bids on No. 1 factory bundles to be generated by auto body stamping plants this month. An important mill has advised brokers that its buying price for industrial No. 1 heavy melting steel to be returned by its customers during September will be $41 a ton. That's $1.50 more than its August buying price, but some scrap interests feel consumers will have to pay at least $42 a ton for any large uncommitted tonnages of that grade.

● **Pittsburgh**—No. 1 heavy melting scrap is up $2 a ton on a broker's purchase for a mill on the fringe of the district. The price paid dealers was equivalent to $38 delivered to local consumers. No. 1 dealer bundles and No. 1 busheling are up $2 a ton on appraisal, but No. 2 heavy melting is unchanged at $30.

● **Philadelphia**—With steel production expanding, domestic prices on several grades of scrap are up. No. 1 heavy melting is higher at $40-$41, delivered; No. 2 heavy melting is $36-$37; No. 1 bundles $43-$44; No. 2 bundles $26-$27; electric furnace bundles $45; and heavy breakable cast $40-$41.

● **New York**—While brokers' buying prices are unchanged, the major steelmaking grades of scrap reflect some strength, largely due to increasing steel production and steady export demand. Japan is expected to cover its next quarter requirements within a week or so.

● **Cleveland**—The market appears to be stronger following the advance of 50 cents to $1 a ton on industrial material. Dealers are not pressing for higher prices, fearing the list now is at a level that will influence the bringing in of idle blast furnace capacity with resulting greater competition from hot metal.

A Youngstown area steelmaker paid $43 for No. 1 heavy melting industrial scrap, $2 more than it paid a month ago. Another producer bought the same grade at $42.

● **Buffalo** — A leading consumer bought limited tonnages of No. 2 bundles and turnings grades at prevailing prices last week. It was the first time in more than two months that the mill purchased dealer scrap. Secondary mill grades are unchanged, but there's growing evidence that the primary grades are moving into higher ground.

● **Cincinnati**—Prices moved up $1-$2 a ton as a local mill entered the market for September delivery tonnage. Another area mill has not announced a program for the month and apparently will be buying only selectively. No. 1 heavy melting is quoted $35-$36, and buying of the blast furnace grades raised prices on those items $1 a ton in brokers' quotations.

● **St. Louis**—The market is stronger, and district mills are paying higher prices for larger tonnages. The pickup in buying reflects reappraisal of inventories by mills in light of the general business revival. Brokers are quoting $31 on No. 2 heavy melting, $25 for No. 2 bundles, $16.50 for machine shop turnings, $18.50 for shoveling turnings, $40 for No. 1 railroad heavy melting, $56 for rerolling rails, $43 for railroad specialties.

● **Birmingham** — Prices are unchanged, but brokers report underlying strength. They think some advance could accompany the expected pickup in demand this month.

● **Houston**—Some export loadings may be shifted from the Gulf Coast to South Atlantic ports because of the scarcity of scrap in the area. Spot purchases to fill Gulf cargoes have been made at high price levels. Exporters here have reached into Kansas for material.

● **San Francisco**—Scrap sales and collections are still slow. But pressure for higher prices is developing.

● **Portland, Oreg.**—Signs of strength are showing in the market here, and price increases are expected on some grades. Currently, $45-$46 is quoted on No. 1 heavy melting, but that grade is not in plentiful supply, and dealers look for an early increase.

● **Seattle**—While mill buying has increased, exports are providing the main strength. Increased domestic demand, however, is expected to bring higher prices. The chief export problem concerns congestion

(*Please turn to Page* 159)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Sept. 6, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Sept. 6	$39.50
Aug. 30	38.67
Aug. Avg.	38.33
Sept. 1960	32.00
Sept. 1956	59.08

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*37.00-38.00*
No. 2 heavy melting	29.00-30.00
No. 1 dealer bundles	*38.00-39.00*
No. 2 bundles	24.00-25.00
No. 1 busheling	*37.00-38.00*
No. 1 factory bundles	*47.00-48.00*
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Short turnings	20.00-21.00
Cast iron borings	19.00-20.00
Cut structurals:	
2 ft and under	*43.00-44.00*
3 ft and under	*40.00-41.00*
Heavy turnings	27.00-28.00
Punchings & plate scrap	*44.00-45.00*
Electric furnace bundles	*44.00-45.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	34.00-35.00
Stove plate	34.00-35.00
Unstripped motor blocks	24.00-25.00
Clean auto cast	35.00-36.00
Drop broken machinery	*47.00-48.00§*

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Random rails	45.00-46.00
Angles, splice bars	44.00-45.00
Railroad specialties	46.00-47.00
Rails, rerolling	59.00-60.00

Stainless Steel Scrap

18-8 bundles & solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	85.00-90.00
410 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	41.00-42.00
No. 1 hvy melt., dealer	39.00-40.00
No. 2 hvy melting	*35.00-36.00*
No. 1 factory bundles	45.00-46.00
No. 1 dealer bundles	*41.00-42.00*
No. 2 bundles	24.00-25.00
No. 1 busheling, indus.	41.00-42.00
No. 1 busheling, dealer	39.00-40.00
Machine shop turnings	17.00-18.00
Mixed borings, turnings	19.00-20.00
Shovel turnings	19.00-20.00
Cast iron borings	19.00-20.00
Cut structurals, 3 ft	45.00-46.00
Punchings & plate scrap	*47.00-48.00*

Cast Iron Grades

No. 1 cupola	*43.00-44.00*
Stove plate	*38.00-39.00*
Unstripped motor blocks	*34.00-35.00*
Clean auto cast	*48.00-49.00*
Drop broken machinery	*48.00-49.00*

Railroad Scrap

No. 1 R.R. heavy melt.	43.00-44.00
R.R. malleable	*48.00-49.00*
Rails, 2 ft and under	*51.00-52.00*
Rails, 18 in. and under	*52.00-53.00*
Angles, splice bars	*47.00-48.00*
Axles	*58.00-59.00*
Rails, rerolling	*61.00-62.00*

Stainless Steel Scrap

18-8 bundles, solids	190.00-195.00
18-8 turnings	110.00-115.00
430 bundles & solids	95.00-100.00
430 turnings	55.00-60.00

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.00-32.00
No. 2 bundles	24.00-25.00
No. 1 busheling	31.00-32.00
Shovel turnings	17.00-18.00
Machine shop turnings	13.00-14.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	39.00-40.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	37.00-38.00
No. 1 machinery	44.00-45.00

Railroad Scrap

Rails, random lengths	42.00-43.00
Rails, 3 ft and under	48.00-49.00
Railroad specialties	41.00-42.00
Rails, rerolling	*64.00-65.00*

CLEVELAND

No. 1 heavy melting	*38.00-39.00*
No. 2 heavy melting	24.00-25.00†
No. 1 factory bundles	42.00-43.00
No. 1 bundles	*38.00-39.00*
No. 2 bundles	23.00-24.00†
No. 1 busheling	*38.00-39.00*
Machine shop turnings	*13.00-14.00*
Shovel turnings	*17.00-18.00*
Mixed borings, turnings	*17.00-18.00*
Cast iron borings	*17.00-18.00*
Cut foundry steel	*35.00-36.00*
Cut structurals, plate, 2 ft and under	41.00-42.00
Low phos. punchings & plate	37.00-38.00
Alloy free, short shovel turnings	18.00-19.00
Electric furnace bundles	*40.00-41.00*

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	47.00-48.00
Burnt cast	32.00-33.00
Drop broken machinery	48.00-49.00

Railroad Scrap

R.R. malleable	48.00-49.00
Rails, 2 ft and under	49.00-50.00
Rails, random lengths	45.00-46.00
Rails, 18 in. and under	50.00-51.00
Cast steel	42.00-43.00
No. 1 railroad cast	49.00-50.00
Railroad specialties	44.00-45.00
Angles, splice bars	45.00-46.00
Rails, rerolling	50.00-57.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	160.00-165.00
18-8 turnings	95.00-100.00
430 clips, bundles, solids	80.00-85.00
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	*41.00-42.00*
No. 2 heavy melting	25.00-26.00†
No. 1 busheling	*41.00-42.00*
No. 1 bundles	*41.00-42.00*
No. 2 bundles	25.00-26.00†
Machine shop turnings	*15.00-16.00*
Shovel turnings	*20.00-21.00*
Cast iron borings	*20.00-21.00*
Low phos.	41.00-42.00
Electric furnace bundles	*42.00-43.00*

Railroad Scrap

No. 1 R.R. heavy melt.	41.00-42.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*35.00-36.00*
No. 2 heavy melting	*29.00-30.00*
No. 1 bundles	*36.00-37.00*
No. 2 bundles	*21.00-22.00*
No. 1 busheling	*35.00-36.00*
Machine shop turnings	9.00-10.00
Mixed borings, turnings	*12.00-13.00*
Shovel turnings	*13.00-14.00*
Cast iron borings	*13.00-14.00*
Low phos., 18 in.	40.00-41.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	*37.00-38.00*
Rails, 18 in. and under	*48.00-49.00*
Rails, random lengths	*42.00-43.00*

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	36.00
No. 2 heavy melting	*31.00*
No. 1 bundles	35.00
No. 2 bundles	*25.00*
No. 1 busheling	34.00
Machine shop turnings	*16.50*
Shovel turnings	*18.50*

Cast Iron Grades

No. 1 cupola	37.00
Charging box cast	34.00
Heavy breakable cast	32.00
Unstripped motor blocks	34.00
Clean auto cast	38.00
Stove plate	33.00

Railroad Scrap

No. 1 R.R. heavy melt.	*40.00*
Rails, random lengths	40.00
Rails, rerolling	*56.00*
Rails, 18 in. and under	44.00
Railroad specialties	*43.00*
Angles, splice bars	40.00†

PHILADELPHIA

No. 1 heavy melting	*40.00-41.00*
No. 2 heavy melting	*36.00-37.00*
No. 1 bundles	*43.00-44.00*
No. 2 bundles	*26.00-27.00*
No. 1 busheling	43.00
Electric furnace bundles	*45.00*
Mixed borings, turnings	17.00†
Shovel turnings	20.00
Machine shop turnings	14.00
Heavy turnings	25.00†
Structurals & plates	44.00-46.00
Couplers, springs, wheels	45.00
Rail crops, 2 ft & under	51.00-53.00

Cast Iron Grades

No. 1 cupola	40.00
Heavy breakable cast	*40.00-41.00*
Drop broken machinery	49.00-50.00†
Malleable	49.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	4.50-5.00†
Mixed borings, turnings	5.00-5.50†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	34.00-35.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	31.00-32.00

Stainless Steel

18-8 sheets, clips, solids	160.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	*33.00-34.00*
No. 2 heavy melting	25.00-26.00
No. 1 bundles	35.00-36.00
No. 2 bundles	23.00-24.00
No. 1 busheling	*32.00-33.00*
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00

Cast Iron Grades

No. 1 cupola	*34.00-35.00*
Mixed cast	*31.00-32.00*
Stove plate	*28.00-29.00*
Heavy breakable	*27.00-28.00*
Unstripped motor blocks	22.00-23.00
Clean auto cast	39.00-40.00

Stainless Steel Scrap

18-8 bundles & solids	170.00-175.00
18-8 turnings	70.00-75.00
430 bundles & solids	70.00-75.00

BIRMINGHAM

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	30.00-31.00
No. 1 bundles	38.00-39.00
No. 2 bundles	22.00-23.00
No. 1 busheling	38.00-39.00
Cast iron borings	10.00-11.00
Machine shop turnings	18.00-19.00
Shovel turnings	20.00-21.00
Bar crops and plate	44.00-45.00
Structurals & plate	43.00-44.00
Electric furnace bundles	38.00-39.00
Electric furnace:	
3 ft and under	36.00-37.00
2 ft and under	37.00-38.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Stove plate	42.00-43.00
Unstripped motor blocks	31.00-32.00
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	39.00-40.00
Rails, 2 ft and under	46.00-47.00
Rails, random lengths	42.00-43.00
Angles, splice bars	43.00-44.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	33.00-34.00
No. 1 bundles	38.00-39.00
No. 2 bundles	24.00-25.00
Machine shop turnings	12.50-13.00
Crushed turnings	17.00
Low phos. plate & structurals:	
3 ft	41.00-42.00
2 ft and under	45.00-46.00

Cast Iron Grades

No. 1 cupola	41.50-42.50
Heavy breakable	25.00-26.00
Foundry malleable	29.00-30.00
Unstripped motor blocks	30.00-31.00

Railroad Scrap

R.R. heavy melt. (3 ft)	40.00-41.00

LOS ANGELES

No. 1 heavy melting	43.00-45.00
No. 2 heavy melting	40.00-41.00
No. 1 bundles	41.00
No. 2 bundles	29.00
No. 2 bundles (export)	30.00
Machine shop turnings	20.00
Shovel turnings	20.00
Cast iron borings	17.00-18.00
Electric furnace scrap	50.00-52.00

Cast Iron Grades

No. 1 cupola	49.00-50.00

Railroad Scrap

No. 1 R.R. heavy melt.	43.00-45.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	*46.00*
No. 2 heavy melting	41.00-42.00
No. 2 bundles	31.00
Shovel turnings	18.00
Electric furnace	54.00

Cast Iron Grades

No. 1 cupola	41.00
Heavy breakable	38.00
Unstripped motor blocks	39.00
Stove plate (f.o.b. plant)	37.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	46.00
No. 1 hvy (unprepared)	41.00
No. 2 heavy melting	43.00
No. 2 hvy (unprepared)	38.00
No. 2 bundles	32.00
Shovel turnings	16.00-18.00
Electric furnace	52.00

Cast Iron Grades

No. 1 cupola	41.00
Heavy breakable cast	38.00
Stove plate (f.o.b. plant)	36.00
Unstripped motor blocks	37.00

SAN FRANCISCO

No. 1 heavy melting	43.00**
No. 2 heavy melting	40.00**
No. 1 bundles	34.00**
No. 2 bundles	29.00**
Machine shop turnings	16.00-18.00
Mixed borings, turnings	16.00-18.00
Cast iron borings	16.00-18.00
Heavy turnings	16.00-18.00
Shovel turnings	16.00-18.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	31.00
No. 2 hvy melt, 2 ft & under	30.00
No. 1 bundles	31.00
No. 2 bundles	23.50
Mixed steel scrap	23.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	31.00
Unprepared	25.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

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SPO-MILWAUKEE BRIQUETTING PRESS!

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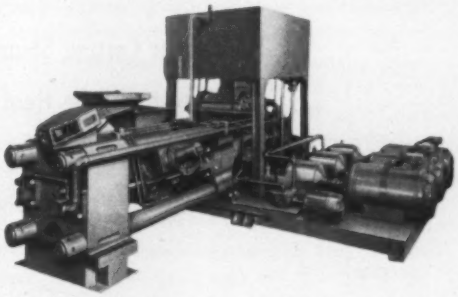

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10463-SI

Reaction to Copper Troubles Mild

Nonferrous Metal Prices, Pages 158 & 159

ALTHOUGH the copper industry has numerous problems, metalmen still do not feel that it is headed for serious trouble.

• **Sources of Unrest**—Many times in the recent past the market would have been upset by the simultaneous occurrence of: 1. A complete shutdown of Chilean production. 2. A major domestic strike, like the one at Kennecott's Utah facilities. 3. Continued unrest in Africa. 4. The persistent rumor that Russia again is seeking 60,000 tons of Chilean copper. But up to Labor Day, those developments created little concern at home or abroad.

It wasn't until early last week that the London Metal Exchange (LME) price showed signs of moving up. At the same time, the price of Katanga copper advanced about half a cent a pound. On the domestic scene, the price of No. 2 copper scrap inched up; futures on the Commodity Exchange advanced slightly; and demand for the red metal showed some firmness. Some of the action was attributed to the industry's troubles, but it was also caused partly by a normal post-Labor Day pickup in business.

• **No Trouble Unless**—Market observers say there is no reason to panic now, and there won't be unless the troubles persist for another month to six weeks. They feel that the strikes will be settled before they cause too much damage.

There is enough copper abroad to stave off heavy fear buying. The LME has something over 20,000 tons on hand. Stocks outside the U. S. are equivalent to a two month supply. In addition, prestrike Chilean metal is still en route to Europe.

In the U. S., stocks are considered fairly low by historical standards, but as yet the supply has not been interrupted. Kennecott's Utah smelter is still producing and will continue in operation until at least Sept. 15 even if the strike by Local 1081 of the International Brotherhood of Electrical Workers has not been settled by then. (Negotiations were resumed as STEEL went to press. Kennecott had reached agreement with 18 of its 19 locals.)

• **Cry Wolf Overdone**—There is always the potentially dangerous African problem. But metalmen are tired of jumping every time somebody cries wolf and are temporarily discounting the situation in their planning.

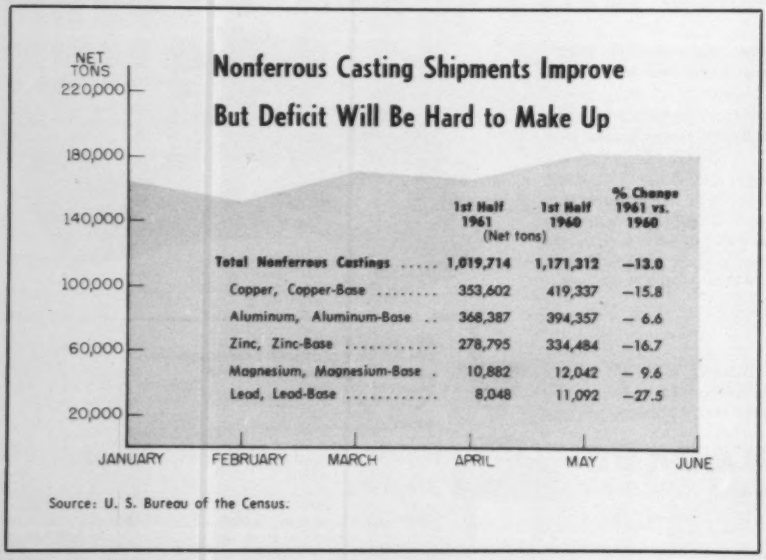
They also discount the Russian rumor as a political move. Russia has never obtained any Chilean copper directly (although it has trade agreements with Great Britain and West Germany for copper). Even if it did, coppermen say the 60,000 tons (about one-tenth of Chile's annual production) would be spread over such a long term that it wouldn't disturb the world market.

One copper official told STEEL: "Every time there is political or labor unrest down there, the Russians make this propaganda move. And when you trace it down, you always find that they want the metal at a discount."

• **Vacations Help**—One reason why the situation isn't too alarming: Vacations at home and abroad temporarily cut down demand for copper. If the current developments had come in early spring or late fall, it would have been a different story.

But metalmen are counting on a smooth flow of copper by the time they need it most. They are looking for sales to average 120,000 to 125,000 tons a month through December, unless there is trouble in the auto industry. That could lift total 1961 shipments to fabricators above the 1,279,745 tons delivered last year.

The domestic price is firm at 31 cents a pound. If any of the industry's problems become acute, watch LME, custom smelter, and dealer prices for clues to a general price movement.



Nonferrous Casting Shipments Improve But Deficit Will Be Hard to Make Up

	1st Half 1961 (Net tons)	1st Half 1960	% Change 1961 vs. 1960
Total Nonferrous Castings	1,019,714	1,171,312	−13.0
Copper, Copper-Base	353,602	419,337	−15.8
Aluminum, Aluminum-Base	368,387	394,357	− 6.6
Zinc, Zinc-Base	278,795	334,484	−16.7
Magnesium, Magnesium-Base	10,882	12,042	− 9.6
Lead, Lead-Base	8,048	11,092	−27.5

Source: U. S. Bureau of the Census.

This is the first in a Series of Comments on various and vital aspects of Service in the Ferroalloys Industry.

at Vanadium Corporation of America

SERVICE COMES FIRST

Over 55 years ago when we began business as one of the first U.S. producers of ferroalloys, the factors of Price, Quality and Service were, even as they are today, the governing features of any progressive business organization. But time has proven that their interrelationship has changed; Service has now taken on new importance.

Service is Vital The first two—Price and Quality—are actually basic. It is obvious that the producer must charge a competitive price or his goods pile up on the shelves—unsold. He must also offer quality merchandise or his customers soon go elsewhere. Service, on the other hand, varies widely from producer to producer, and it is in this area that the buyer stands most to gain.

Service, however, cannot stand alone without the supporting influence of a fair return for the product sold, which not only makes available a quality product but also allows the producer to explore for new low-cost sources of raw materials, to maintain modern efficient production equipment, supply technical service and carry on the all-important Research and Development activities.

Few Offer All Three We believe that any producer in our industry today who does not provide for all three—Price, Quality and Service—is failing in his responsibility to his customers. Nearly all producers offer competitive price—somewhat fewer furnish top quality—but the great majority, including suppliers of foreign-produced material, are not prepared to extend more than minimum service.

Vanadium Corporation, on the other hand, offers you complete service. Here's what we mean:

Our Own Mines—Integrated mining and milling facilities provide, on a long-term basis, a consistent supply of high grade ores of controlled quality. Producers who rely on the purchase of distressed lots in the world market may temporarily profit but jeopardize the customers' requirements for a dependable and continuing supply of quality products.

Modern Plant Facilities—Our plants are among the most modern in the industry and are strategically located near consuming industries.

Production Planning—An extensive production-planning group assures you of an adequate supply of quality products—when you need them! Expeditious handling of every order is facilitated by a private network of teletype equipment linking district offices, plants, Research Center and headquarters offices.

Research Center—We are among the few ferroalloy producers who can claim the distinct advantages of fully equipped modern research facilities. This R and D supervision, over short-and long-term work, assures the development of new and better products, and provides adequate technical customer service.

Pilot Plant—Here complete facilities prove a product under actual operating conditions before it is ever offered commercially. The plant also provides complete customer service.

Engineering Sales—Widely experienced technical field personnel are located in district offices near you, always on call.

Field Stocks—Adequate stocks of required products are available in mill quantities when you need them.

Distribution—Vancoram Products are available from distributors with warehouses conveniently located throughout the country.

Over 4,000 VCA employees staff these facilities with a devoted interest in you—the customer.
When you think of ferroalloys—think of Vancoram, where SERVICE COMES FIRST.

SERVICE COMES FIRST

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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 29.00; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $40 per lb and up nom.

Copper: Electrolytic, 31.00 deld; custom smelters, 31.00 nom; lake, 31.00 deld; fire refined, 30.75.

Germanium: Purified, ingots, less than 1 kg 37.50 per gram; 1-10 kg 32.00 per gram; 10 kg or more, 29.95 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld; 24-99 lb, $9.50; 100-449 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $188-191 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 81.25; 10-lb pig, unpacked, 89.00; "XX" nickel shot, 88.75; "F" nickel shot for addition to cast iron, in kegs, 81.75; "F" nickel, 5 lb ingots, 82.75. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.09; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 77.50.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l, 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l, 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $5.25 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 121.50.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max), $1.37 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.25.

Zinc: Prime Western, 11.50; brass special 11.70; intermediate, 11.70, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.35; special high grade, 12.50 deld. Diecasting alloy ingot No. 3, 13.75; No. 2, 14.25; No. 5, 14.00 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $7.25-7.75 per lb; 100-500 lb, $6.75-7.25 per lb; 500-1000 lb, $6.25-6.75; over 1000 lb, $6.25 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.00; No. 12 foundry alloy (No. 2 grade), 21.25; 5% silicon alloy, 0.60 Cu max, 23.00; 13 alloy, 0.60 Cu max, 23.00; 195 alloy, 24.25; 108 alloy, 21.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 22.75; grade 2, 21.50; grade 3, 20.50; grade 4, 19.50.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 405, 27.50; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.955, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.98. Weatherproof 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $5.70-15.50; sheared mill plate, $4.45-9.00; wire, $5.00-9.50; forging billets, $3.00-4.75; hot-rolled and forged bars, $3.39-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $11.00-16.00; H.R. strip, $11.00-15.00; C.R. strip, $13.00-18.00; forged or H.R. bars, $11.00-15.00.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	147	126	145
Strip, C.R.	133	114	145
Plate, H.R.	134	116	133
Rod, Shapes, H.R.	116	95	116
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.183	24-72	72-180	45.40-48.00
0.183-0.154	24-72	72-180	45.40-48.00
0.154-0.120	24-72	72-180	45.90-48.80
0.120-0.096	24-72	72-180	45.90-48.80
0.096-0.076	24-72	72-180	46.40-50.30
0.076-0.060	24-72	72-180	46.90-51.10
0.060-0.047	24-72	72-180	47.40-52.30
0.047-0.037	24-72	72-180	47.90-53.70
0.037-0.030	24-72	72-180	48.40-55.30
0.030-0.023	24-60	72-180	48.90-57.10
0.023-0.018	24-48	72-144	49.40-57.40
0.018-0.014	24-48	72-144	51.20-58.00
0.014-0.011	24-48	72-144	53.50-60.00
0.011-0.0085	24-36	72-96	56.20
0.0085-0.007	24-36	72-96	59.20
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates: 1100, 3003, and 5005, mill finish, 0, H12, and H14 tempers, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
3.000-2.000	6-144	72-240	48.10-51.00
2.000-1.251	6-144	72-240	46.50-51.30
1.251-0.751	6-144	72-240	45.50-50.60
0.751-0.250	6-144	72-240	45.50-50.60

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Rounds, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.00
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in.,103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. width; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 25.00-25.50; No. 2 heavy copper and wire, 23.25-23.75; light copper 20.50-21.00; No. 1 composition red brass, 22.00-22.50; No. 1

BRASS MILL PRICES

(Copper or Copper Alloy No.)	MILL PRODUCTS a Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	SCRAP ALLOWANCES d (Based on copper at 31.00c) Clean Heavy	Rod Ends	Clean Turnings
Copper (110)	56.13b	50.36-51.36	....	57.32	27.00	27.00	26.25
Yellow Brass (268, 270)	49.27	35.77c	49.56	53.43	20.375	19.50c	18.50c
Low Brass, 80% (240)	52.15	52.09	52.44	56.21	22.875	22.625	22.125
Red Brass, 85% (230)	53.17	53.11	53.46	57.23	23.875	23.625	23.125
Com. Bronze, 90% (220)	54.73	54.67	55.02	58.54	24.75	24.50	24.00
Manganese Bronze (675)	57.69	51.27	61.54	....	19.25	19.00	18.50
Muntz Metal (365)	51.94	47.25	....	....	19.125	18.875	18.375
Naval Brass (464)	53.94	47.75	60.25	58.10	19.00	18.75	18.25
Silicon Bronze (651)	61.39	60.58	60.68	79.80	26.50	26.25	25.75
Nickel Silver, 10% (745)	65.56	67.16	66.91	....	26.00	25.75	13.00
Phos. Bronze, A-5% (510)	76.97	77.47	76.72	78.90	28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 21.00-21.50; new brass clippings, 18.50-19.00; light brass, 15.50-16.00; heavy yellow brass, 16.50-17.00; new brass rod ends, 17.50-18.00; auto radiators, unsweated, 18.25-18.75; cocks and faucets, 18.50-19.00; brass pipe, 18.50-19.00.

Lead: Soft scrap lead, 7.25-7.50; battery plates, 3.00-3.25; linotype and stereotype, 8.50-8.75; electrotype, 8.00-8.25; mixed babbitt, 10.00-10.50.

Monel: Clippings, 26.00-26.50; old sheets, 25.00-25.50; turnings, 18.50-19.00; rods, 25.00-25.50.

Nickel: Sheets and clips, 56.00-58.00 rolled anodes, 56.00-58.00; turnings, 43.00; rod ends, 56.00-58.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 3.00-3.50; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 4.00-4.50; segregated high copper clips, 9.75-10.25; mixed low copper clips, 10.25-10.75; mixed high copper clips, 9.75-10.25.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 9.50-10.00; clean borings and turnings, 7.00-7.50; segregated low copper clips, 14.50-15.00; segregated high copper clips, 13.00-13.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.50; clean borings and turnings, 8.50-9.00; segregated low copper clips, 13.50; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50-13.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.

Copper and Brass: No. 1 heavy copper and wire, 28.75; No. 2 heavy copper and wire, 26.75; light copper, 24.50; refinery brass (60% copper) dry copper content, 25.50.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 28.75; No. 2 heavy copper and wire, 26.75; light copper, 24.50; No. 1 composition borings, 24.00-24.50; No. 1 composition solids, 24.50-25.00; heavy yellow brass solids, 19.00; yellow brass turnings, 18.00; radiators, 20.50-21.00.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.50; oval, 44.50; electrodeposited, 37.50; cast, 42.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 117.50; 500-1999 lb, 110.50; 2000-4999 lb, 107.00; 5000-29,999 lb, 106.00; 30,000 lb, 105.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 143.50; 200-499 lb, 142.00; 500-999 lb, 141.50; 1000 lb or more, 141.00.

Zinc: Balls, 18.25; flat tops, 18.25; flats, 21.00; ovals, 20.25, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.50; 2000-5900 lb, 13.50; 6000-11,900 lb, 13.25; 12,000-22,900 lb, 13.00; 23,000 lb or more, 12.50.

Nickel-Chloride: 100 lb, 47.50; 200 lb, 45.50; 300 lb, 44.50; 400-4900 lb, 42.50; 500-9900 lb, 40.50; 10,000 lb or more, 39.50.

Nickel Sulphate: 5000-22,999 lb, 31.00; 23,000-39,900 lb, 30.50; 40,000 lb or more, 30.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 90.50; 100-600 lb, 80.80; 700-1900 lb, 78.10; 2000-9900 lb, 76.20; 10,000 lb or more, 74.90.

Stannous Chloride (Anhydrous): 100 lb, 150.30; 400 lb, 140.30; 800-19,900 lb, 119.00; 20,000 lb or more, 114.80.

Stannous Sulphate: Less than 50 lb, 157.40; 50 lb, 127.40; 100-1900 lb, 125.40; 2000 lb or more, 123.40.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 153*)

at Japanese ports where full cargo scrap freighters have been delayed 30 days or more. Reports indicate the condition will not be resolved for 60 days. Meanwhile, shipowners are asking protection. Full cargo charters range from $71,000 to $75,000, free load and discharge, for an average of 9500 tons. To compensate for possible delays at destination, owners are asking $90-000 or higher unless prompt discharge is guaranteed.

• **Los Angeles**—The steel mills are returning to the market, bolstering demand prospects for September. Prices are expected to hold steady, despite Japanese pressure for reductions. Dealer inventories are low; one yard reports its inventory is down to 3000 tons from a normal 10,000.

Scrap Industry Denied Freight Rate Relief

The Interstate Commerce Commission has denied a complaint for freight rate relief which was filed a year ago by the Institute of Scrap Iron & Steel.

The institute and 360 of its 500 members contended that the scrap industry was paying too much—the same rates as those for pig iron and iron ore. Also, it was maintained that because of technological advances in steelmaking, the industry needed a reduction in rates to make the use of scrap in furnace melts more desirable.

Structural Shapes . . .

Structural Shape Prices, Page 144

Considerable structural tonnage is being estimated by fabricators, and substantial orders continue to be placed for both private and public work. The situation varies from district to district, but generally, August was one of the best months of the year for bookings, and indications are September volume will maintain the pace.

Price competition among the fabricators continues to be keen, but as backlogs accumulate and rolling cycles lengthen, buyers face an extension of deliveries. This should serve to firm up the market.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

15,000 tons, Gowanus Expressway, New York, through Slattery Construction Co., to Harris Structural Steel Co., New York.

14,670 tons, state highway work, Northern Boulevard, Queens, New York, through Slattery Construction Co., New York, to American Bridge Div., Pittsburgh, U. S. Steel Corp.

950 tons, addition, Robert Treat Hotel, Newark, N. J., through George Driscoll, general contractor, to Bethlehem Fabricators, Bethlehem, Pa.

200 tons, Theme Exhibit Building, Seattle Century 21 Exposition, to Pacific Coast Div., Seattle, Bethlehem Steel Co.; Howard S. Wright Construction Co., Seattle, general contractor.

STRUCTURAL STEEL PENDING

5200 tons, state bridgework, Fire Island, Suffolk County, New York; Karl Koch is low on the general contract.

3113 tons, state highway bridges, Hartford-Wethersfield, Conn.; Oneglia & Gervasini

CLASSIFIED ADVERTISING

Representatives Wanted

NEW PLANT—NEW PRODUCTS

We need Mfg. Representatives and/or Sales Engineering firms to distribute our products including standard steel Storage Buildings; Closures; Fall-Out Shelters. Also Standard Steel Guard Rail Fence and Posts that meet State Highway specifications of most states. Write or wire:

Permco Metal Fabricators Co.
Lowellville, Ohio

Help Wanted

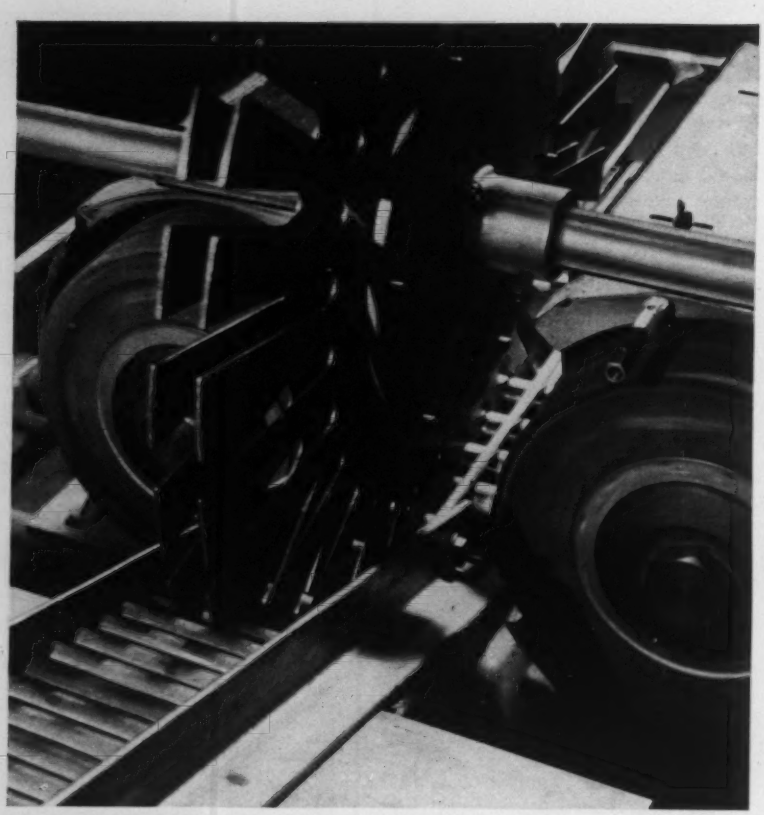
EXPERIENCED ROLL TURNER to turn merchant bar mill rolls. Reply Box 960, STEEL, Penton Bldg., Cleveland 13, Ohio.

WE CAN HELP YOU TO CONTACT high calibre men to fill specific jobs you have in mind.

Readers of STEEL include men of wide training and experience in the various branches of the metalworking industry. When you have an opportunity to offer, use the Help Wanted columns of STEEL.

Help Wanted

WANTED — ASSISTANT SUPERINTENDENT blast furnace operation. Young well established completely integrated steel company located in great southwest area needs to fill key position in its blast furnace department with well qualified man age limit 45 years. Company currently engaged in multi-million dollar expansion program. Excellent opportunity. Submit complete resume giving personal history, education, experience and salary requirements. All replies held confidential. Box 961, STEEL, Penton Bldg., Cleveland 13, Ohio.



SPECIAL POWER BRUSHING MACHINE at Kenmore Machine Products, Inc., Lyons, New York—uses "Ferris wheel" arrangement to index copper tubes past two Osborn 10" TY® brushing heads for deburring and edge-blending. Tubes are rotated through brushing cycle by endless belts. Machine is adjustable for various tube lengths and diameters. Rate for average 1" dia. part: 3300 pieces per hour.

SAVES $20,000 per year

deburring tubing with OSBORN power brushing

Before: this manufacturer of refrigeration components was using off-hand methods to remove end-burrs from rough cut-off lengths of copper tubing. Production was too slow . . . too costly.

Now: this specially-built automatic machine—equipped with Osborn TY® Master® Wheel power brushes—deburrs the tubes quickly, economically . . . edge-blends the tube ends smoothly, uniformly. *Production is over 8 times faster.* Consistently higher quality has eliminated the 100% inspection formerly required . . . *with total savings about $20,000 per year.*

If you are interested in boosting output . . . improving quality . . . reducing costs on *your* metal finishing jobs of every type—deburring, cleaning, polishing, precision blending—an **O**sborn **B**rushing **A**nalysis can show you how. No cost or obligation. Write or call *The Osborn Manufacturing Company, Dept. S-39, Cleveland 14, Ohio. Phone ENdicott 1-1900*

OSBORN

Metal Finishing Machines . . . and Finishing Methods
Power, Paint and Maintenance Brushes • Foundry Production Machinery

Inc., Torrington, Conn., low on the general contract; also required, 1590 tons of concrete reinforcing steel bars, 406 tons of steel bearing piles, and 615 tons of mat reinforcement.

2000 tons, transmission towers, extensions, etc.; bids to Bonneville Power Administration, Portland, Oreg., Sept. 15.

1715 tons, three passenger-automobile ferries for Alaska; bids to Juneau, Alaska, Sept. 13, advanced from Aug. 30.

971 tons, state bridgework, Allegheny County, Pennsylvania, bids Sept. 29; 836 tons of reinforcing bars also required.

650 tons, Public School No. 242, Brooklyn, N. Y.; bids postponed to Sept. 13.

344 tons, three, dual bridges, Hampden, Maine; bids Sept. 20 to Augusta, Maine.

260 tons, addition to Swedish Hospital, Seattle; bids Sept. 21.

250 tons, Bonneville Power Administration, Ross Warehouse, Vancouver, Wash.; general bids are in.

250 tons, Public School No. 309, Brooklyn, N. Y.; bids postponed to Sept. 13.

REINFORCING BARS . . .

REINFORCING BARS PLACED

2500 tons, Penn Center Apartment, Philadelphia, to American Steel Engineering Co., Philadelphia.

1100 tons, North Gate Apartment, Camden, N. J., to American Steel Engineering Co., Philadelphia.

760 tons, student union building, Boston University, Boston, to U. S. Steel Supply Div., Boston, U. S. Steel Corp.; M. S. Kelliher Co., Boston, general contractor; also, 77 tons of structural steel to Groisser & Shlager Iron Works, Somerville, Mass.

750 tons, hangar, project MPA-1, Logan Airfield, East Boston, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Vappi & Co. Inc., Cambridge, Mass., general contractor.

616 tons, three state highway bridges, Haverhill, Mass., to Northern Steel Inc., Boston; Campanella & Cardi Construction Co., Warwick, R. I., general contractor; 209 tons, steel piles, to the Bethlehem Steel Co., Bethlehem, Pa.

PLATES . . .

PLATES PLACED

869 tons, Hy-80 alloy, Navy Purchasing Office, Washington, D. C., to the Lukens Steel Co., Coatesville, Pa., at $557,522.

142 tons, high tensile, Type 1, Navy Purchasing Office, Washington, D. C., to U. S. Steel Corp., Pittsburgh.

PLATES PENDING

3500 tons, three Alaska State ferries; bid date at Juneau advanced to Sept. 13 from Aug. 30.

510 tons, including 195 tons descaled and painted (two contracts), Navy Purchasing Office, Washington, D. C.; delivery to Mare Island Naval Shipyard, California.

100 tons, 500,000 gallon water tank and accessories; bids to Snoqualmie, Wash., Sept. 11.

RAILS, CARS . . .

LOCOMOTIVES PLACED

International Railways of Central America, 44 diesel-electric locomotives to General Motors Corp. (overseas), contingent on a $4 million loan from the Development Loan Fund to help finance the $6 million order.

RAILROAD CARS PLACED

Brazilian Federal Railway System, major components for 26 stainless steel passenger cars to the Budd Co., Philadelphia. Other components will be supplied by Budd's Brazilian licensee, Mafersa, Sao Paulo, which will assemble the 26 cars.

Transport Leasing Co., forty-six, 3500 cu ft covered hoppercars, for leasing to the Union Carbide Corp., to the Butler, Pa., plant of the Pullman-Standard Div., Pullman Inc., Chicago.

Thailand, 664 freight cars and three coaches; bids Oct. 30. Details available through the Bureau of International Business Operations, U. S. Department of Commerce, Washington, D. C.

Missouri-Kansas-Texas Lines, ten, 70 ton covered hoppercars, to ACF Industries Inc., New York.

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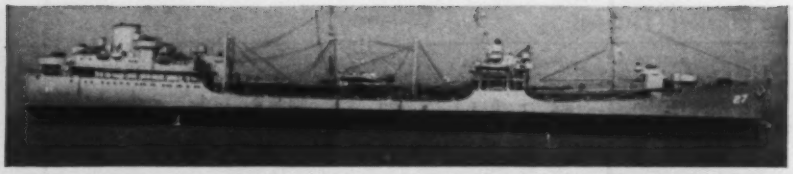
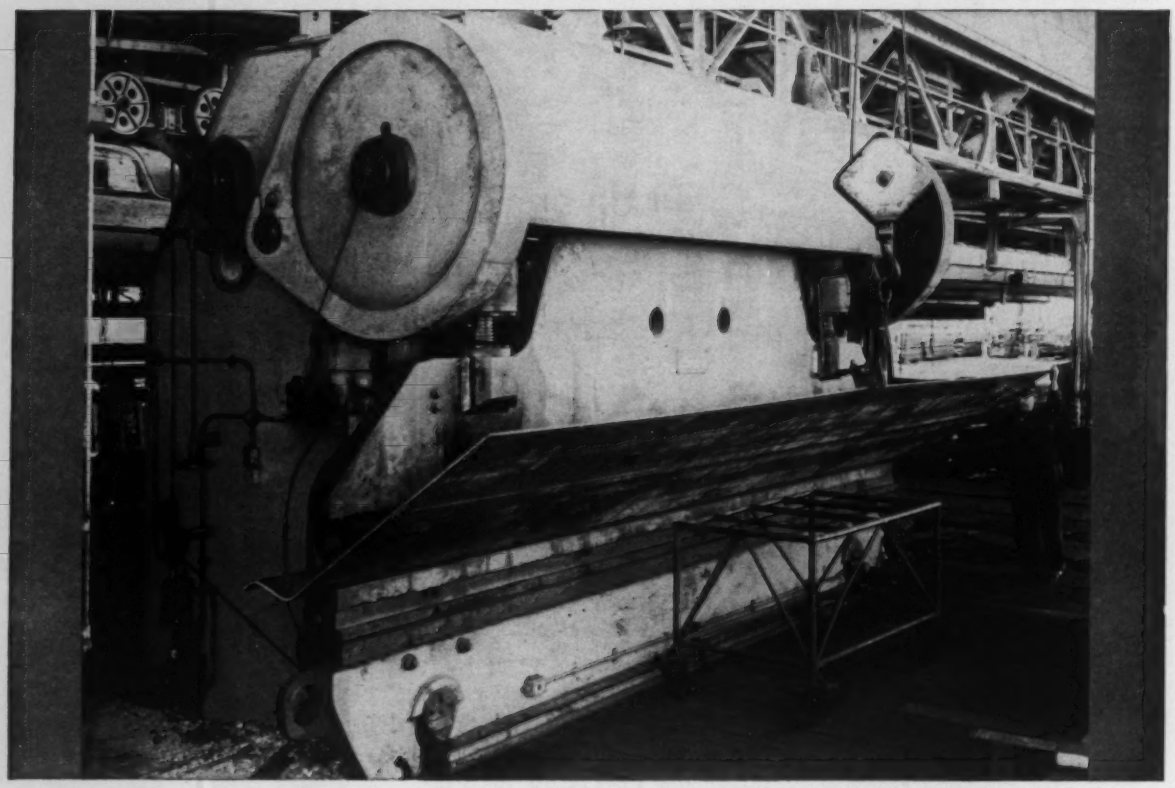
U.S.S. KASKASKIA is typical of many ships which have had extensive bulkhead and other repairs at Moore Dry Dock Company.
Official U. S. Navy Photograph



Moore Dry Dock SPEEDS MARINE REPAIRS



Fluted bulkhead plate being formed by Steelweld bending press in plate shop of Moore Dry Dock Company for bulkhead renewal job on U.S.S. "KASKASKIA" (A027). Size of plate: length 26', width 6', thickness ½".

Long a leading West Coast ship builder and marine repairs concern, the Moore Dry Dock Company, Oakland, California, has found a large Steelweld Bending Press to be a great asset in speeding the forming of heavy plate.

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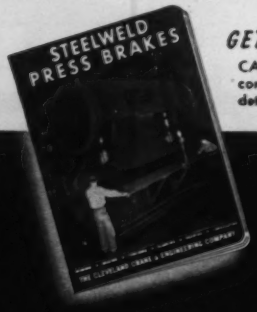

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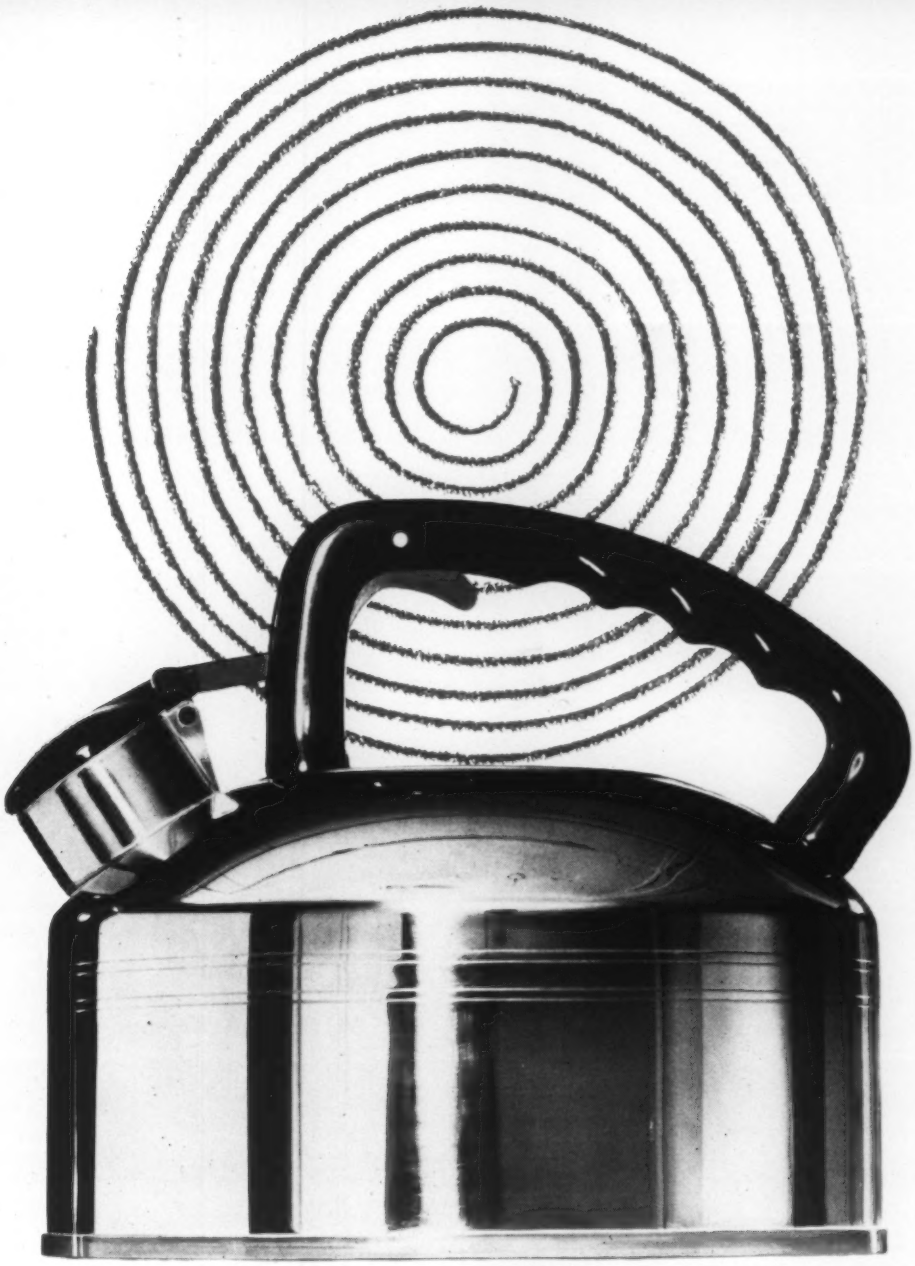

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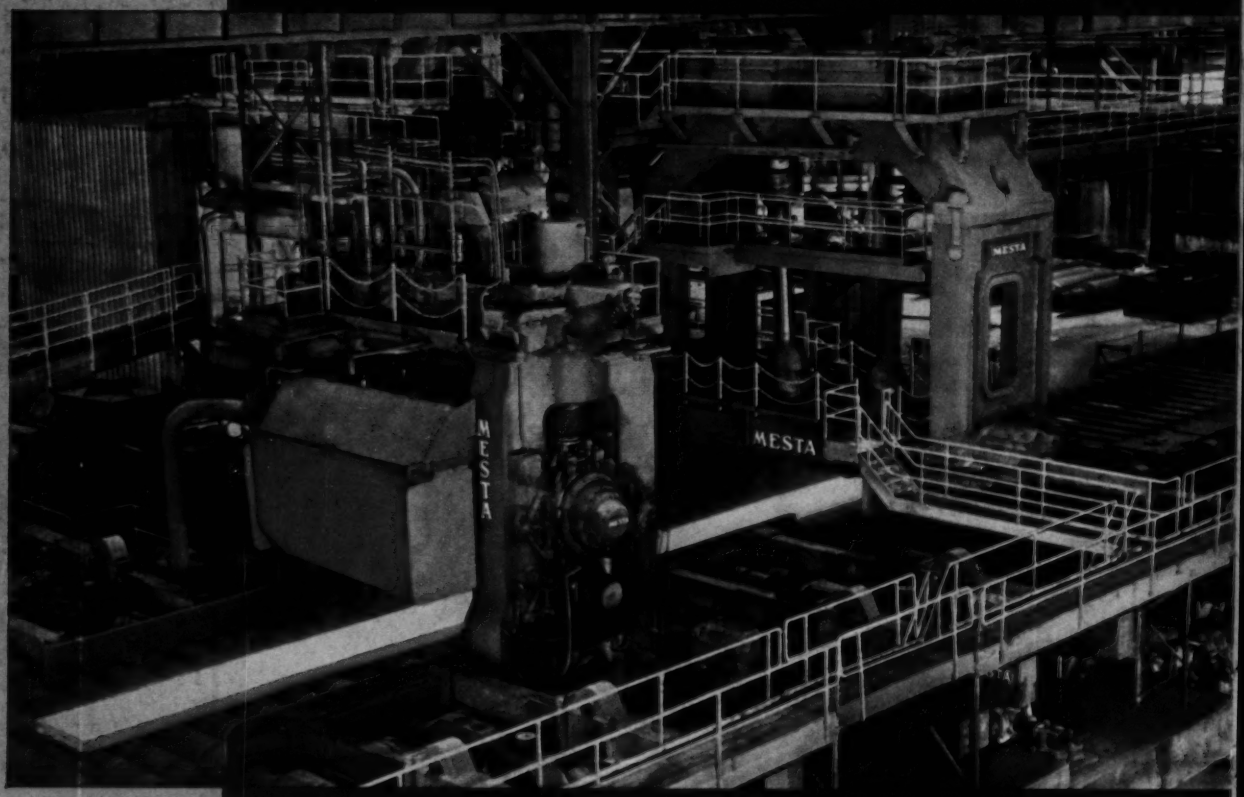

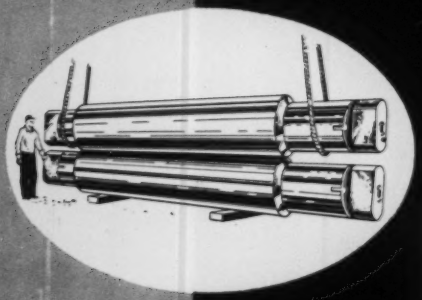

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